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TECHNICAL METHODS OF PERFORMING CERTAIN CRANIAL OPERATIONS[1]

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IT has perhaps been for the ultimate good of cerebral surgery that the wave of enthusiasm in regard to operations on the brain, which followed the first adoption of Lister's new principles, subsided as rapidly as it did, leaving in its wake the lingering impression with most surgeons, and more physicians, that little or nothing was to be expected in the way of surgical treatment for cerebral maladies. Instead of proving a cure-all for tumor, for epilepsy, for hydrocephalus, for meningitis, and the like, surgery cured nothing.

From our present vantage ground, the futile, often disastrous, attempts of earlier days no longer occasion surprise, many factors serving to explain why they were so numerous — an imperfect idea of cerebral localization, indeed localization of function even doubted by many; an imperfect knowledge of the physiology of the intracranial space, of the functions of the cerebrospinal fluid circulation, of the phenomena of compression, of the difference between anatomical lesions of nerve tracts and their simple physiological blocking from pressure, from œdema and the like; and lastly — until the method of osteoplastic resection became perfected — most unsatisfactory ways of exploring the cranial chamber.

The "surgery of the head" became, as of old, largely confined to the treatment of traumatic injuries of the skull; and here, except in the matter of cleanliness, little has actually been added to the knowledge possessed by Hippocrates, or Ambrose Paré, or Percival Pott. Operations again became limited in large measure to the direct treatment of indented fractures of the vault — a dull matter, relieved only by an occasional brilliant case of removal of an extradural clot or the successful drainage of a cerebral abscess of otitic origin.

These things, perhaps, may account for the fact that, in most of our text-books, the surgery of the head is principally devoted to the surgery of cranial fractures; whereas, in matter of fact, these lesions of the bones themselves are only of import in accordance with the damage they have done directly or indirectly to the brain. Thus, for example, in fractures of the cranial base, we hear much of the mechanism of their production, and the external evidences of their presence, but surgeons are far from any uniform agreement in regard to the treatment of the diffuse hæmorrhages and œdema, the cause of the uniformly high mortality in these cases.

Meanwhile, however, through the persistent efforts, particularly of a few men — Bergmann, Kocher, D'Antona, Keen, Krause and Chipault, to mention a few of the leaders, men who have not only shown especial aptitude for neurological operations, but, what is more

[1] Read before the St. Louis Surgical Society, December 16, 1907. Certain paragraphs in this article are in amplification of the views expressed in a chapter in Keen's System of Surgery, vol. iii.

important, who have had some neurological training — a steady advance in technical methods has kept pace with the progress in our anatomical and physiological knowledge of the nervous system.

It is interesting to compare the exploratory operation of to-day — let us say, in illustration, for a cerebral tumor — conducted through a large osteoplastic opening, the procedure often carried out in two stages, possibly with a preliminary decompressive operation in a situation away from that of the suspected growth, in order to give temporary relief from symptoms:— it is interesting to compare such an operation with the explorations which used to be made through a simple trephine opening placed, for example, at a spot previously determined by careful extracranial measurements on the scalp, so as to bring into view the cortical centres for movements of the thumb; whereas the exact physiological situation of these centres on the cortex had not even been determined — in fact, was not determined until the investigations of Sherrington and Grünbaum in 1900.

Although there is evidence at the present day of a certain rebirth or reawakening of interest in matters relating to this important field of surgery, there can be no doubt but that, owing to the need not only of particular technical training, but also of wide neurological experience, the advances, for the time being, must continue to be made largely at the hands of a few men who choose to devote themselves to this, and to exclude themselves from other fields of operative work. The day will doubtless come, as has been the case with all surgical specialties, when matters of operative therapy will be put upon a sound basis for certain conditions, and will be shown to be futile in others; and when this time comes, then may the general surgeon properly and safely undertake to practise these measures and include them among his numerous daily operations.

In the meantime, there is much to be learned in regard to the cerebrospinal fluid circulation before the treatment of cerebrospinal infections, or of acquired and chronic hydrocephalus, can be dealt with; much to be learned in regard to intracranial pressure before we can finally determine the best method of decompression for inaccessible tumors, for the œdema of uremia, the swelling associated with cerebral softening, with encephalitis, with the so-called meningitis serosa, etc; in regard to cerebral hæmorrhages before we can finally come to remove apoplectic clots as safely as we can those from the meningeal spaces; and in regard to many other of the diverse problems which come before the operating neurologist

We are at present making a beginning only, and it will be some time before the general surgeon can afford, with the present large chances of failure, to undertake these very difficult procedures, the success of which depends upon an expenditure of time on individual cases in operating room, ward, and library, which cannot be spared without an almost complete sacrifice of other more usual forms of surgical work.

On this particular occasion, however, I purpose to limit my remarks largely to a description of such technical methods as have come to be more or less habitual, in Dr. Halsted's clinic with which I am associated, in the routine performance of the simpler operations of craniotomy and craniectomy — in other words, of operations in which a portion of the skull is but temporarily displaced, usually for the primary object of intracranial exploration, and those in which it is with forethought removed, usually for purposes of cerebral decompression.

Many of the views to be expressed are purely personal ones and are given with the full realization that the details of preparation and procedure which prove satisfactory to one may be entirely unsuited to the operative requirements of another. Special training and familiarity with a given set of instruments engenders facility in their use; unfamiliarity even with a better tool, awkwardness.

From a purely technical point of view we are more indebted to the method of temporary osteoplastic resection, first attempted by Wagner[1] in 1889, than to any other factor for the satisfactoriness of most of our present-day operations on the cerebral hemispheres. These

[1] W. Wagner. Die temporäre Resection des Schädeldaches an Stelle der Trepanation Cent. f. Chirurgie, 1889, vol. xvi, p. 833

trap-doors may be cut from the cranium with a variety of tools; the simplest armamentarium is a mallet and chisel, the most elaborate, a motor, with its trephines, burrs and saws, driven by electricity. They have both been employed at the hands of their chief advocates with great skill, but they are unsuited to the needs of the many.

Simplicity is a desirable quality in operative technique, but the blows of a mallet, even though transmitted in a glancing direction, are undesirable; and speed, the chief advantage of the moter-driven rotary tools, is invariably a source of danger, even in accustomed hands. It really matters little, except in saving time for the surgeon, whether an osteoplastic flap can be elevated by one method in seven minutes, or whether another requires twenty; and an operator who persists in taking dangerous corners at high speed will be the cause of a serious or fatal accident some day, whether he is driving an automobile or opening a skull. For in the more rapid operation, should dura or cortex happen to be injured at the time of making the bone incision, not only is the chance lessened of a successful outcome, particularly in cases with increased cerebral tension, but also time is actually lost. It is the hare and the tortoise over again.

Although the craniotomy is performed solely to give access to the lesion, whereas the actual operation is what is done to better the condition within the skull, nevertheless I shall dwell at this time merely upon safe methods of making the approach to the surface of the hemisphere, and I shall, perforce, have little to say in regard to the treatment of intracranial lesions themselves.

STEPS OF AN OSTEOPLASTIC RESECTION

Since this procedure may be taken as representative of any major operation on the skull, I shall, at the risk of being tedious, describe the general plan of preparation and performance to which I adhere, the resection itself being that which Da Costa has designated the "combined method"— a method which I feel sure is characterized, at least, by safety; and avoidance of operative accidents in the approach to a cerebral lesion is a matter of no little moment.

General preparation. It is, I believe, a fairly universal custom to have the patient's head shaved and treated antiseptically in the ward on the day before the operation — some even advocate a double preparation of this kind. This I consider an unnecessary precaution, if not positively unwise; for the patient is apt to pass an uncomfortable night and, even with the most expert shaving, the scalp is likely to be a little "sore" the morning of operation. In something over 350 craniotomies I have never seen an infection, even a superficial stitch abscess, and have ceased to regard the chance of sepsis as a possible complication of these operations.[1]

It is our custom, without previous ward preparation, to have the hair clipped and shaved just before the operation — a duty encumbent upon the surgeon himself, in the case of a child or a nervous patient. After a double shaving, once with and then against the direction of emergence of the hairs, there may be a preliminary cleansing of the scalp with green soap and a soft brush, the head then being wrapped in a towel wrung out of warm bichloride solution. The final preparation is deferred until after the anæsthetic.

Position on the table. It is a great advantage, though it does not appear to be a common practice, to place the patient on the table in the position most favorable for the operation before administering the anæsthetic. This shortens the time as well as the depth of anæsthetization, for a degree of narcosis greater than required for operative purposes is necessary before a patient can be moved from stretcher to table without upsetting an even respiration. It insures, furthermore, the patient's being in a comfortable posture, and thus obviates, in large measure, the strain leading to backache, and so forth, which an awkward position and the handling of a relaxed patient engenders. It is particularly important to follow this practice in case the cerebellum or occipital lobes are to be exposed.

Many operators have a particular form of

[1] The recent important discovery of Mr. S. J. Crowe, of our medical school, that formaldehyde is present in the cerebrospinal fluid after the administration of urotropin, might make its administration before the operation desirable in cases in which the possibility of a perfect technique is questionable. It certainly will prove to be a therapeutic agent of the greatest value in all cases in which there is an escape of cerebrospinal fluid after basilar fractures, meningeal wounds, etc.

head-rest for all cranial operations, table extensions for this purpose having been described by Horsley, Frazier, Morestin and others. For the usual operations on the vault, however, small, flat, solid pillows or sandbags seem to be all that are necessary to turn and hold the head in the desired position: on the other hand, I regard a head-extension with shoulder supports as essential for occipital work, chiefly to insure free respiration. Thus do surgeons' views differ. Whatever form of table be used, however, it is desirable to have the head-end capable of being raised or lowered at will.

The anæsthetic. Regardless of the drug to be employed, it is essential that it be administered by an expert — preferably by one who makes this his specialty. Many of the conditions for which these operations are attempted are associated with cardiovascular and respiratory disturbances of cerebral origin, and the greatest care must be exercised lest there be a further burden due to the anæsthetic. Cerebral surgery is no place for a "Guck in die Luft" anæsthetist.[1]

In all serious or questionable cases the patient's pulse and blood-pressure, their usual rate and level having been previously taken under normal ward conditions, should be followed throughout the entire procedure, and the observations recorded on a plotted chart. Only in this way can we gain any idea of physiological disturbances — whether given manipulations are leading to shock, whether there is a fall of blood-pressure from loss of blood, whether the slowed pulse is due to compression, and so on. A further safeguard is an artificial respiration apparatus, to be immediately put into use in case there is failure of an already burdened respiratory centre, either from the anæsthetic, from loss of blood, or from additional medullary pressure due to cerebral manipulation.

Sir Victor Horsley, as is well known, is a strong advocate of chloroform in combination with oxygen, and administered after a preliminary hypodermic of morphine. He emphasizes that only a small amount of the drug is required, except during the early and closing periods of the operation, and that there is less likelihood of vomiting than with ether. The drug thus combined is taken smoothly, without cyanosis, and, furthermore, tends to lower the blood pressure; hence there is said to be less bleeding during the operation.

In this country, where chloroform is doubtless administered less well than ether, the latter is the anæsthetic of choice at most hands, the primary stage usually being induced with ethyl chloride. Kocher believes that there is an element of risk in the lowered blood-pressure under chloroform, and it is perhaps debatable whether this is not a more certain danger than the somewhat greater loss of blood under ether — a drug which tends to hold the blood-pressure high.

The question of the anæsthetic in a two-stage operation is an especially serious one, and under these circumstances, the dangers from chloroform would possibly be less than those of a repeated etherization. Some years ago, however, having had a fatality from chloroform, I employ it far less frequently in cranial operations than ether, restricting its use largely to children.

Local anæsthesia may at times suffice, especially for such simple measures as ventricular puncture, though infiltration of the scalp is difficult. I have learned, furthermore, that in favorable cases no anæsthetic need be required in a second-stage operation limited to manipulations of dura and brain after re-reflecting an original bone-flap.[2]

Preparation of the operative field. With the patient anæsthetized and in proper position on the table the final cleansing is done; for this, alcohol and 1 to 1000 bichloride solution are sufficient.

It is my practice at this stage, before the landmarks are obscured by the covering of operative sheets and towels, to outline the proposed incision on the scalp by a superficial scratch with the scalpel.

[1] We have, of late, in all of our cerebral operations followed the custom of having the etherizer constantly auscultate the heart. This is accomplished by strapping the transmitter of a phonendoscope to the precordium. From this a long tube passes to the aural receiver which is held against the auricle as is the receiver of a telephone operator. This is much more satisfactory than the usual supervision of cardiac action by the occasional palpation of the pulse for which a hand must be disengaged. It is surprising that the method has not come into general practice before this.

[2] Thomas and Cushing. Removal of a Subcortical Cystic Tumor at a Second Stage Operation without Anæsthetic. Journ. of A. M. A. February, 1908.

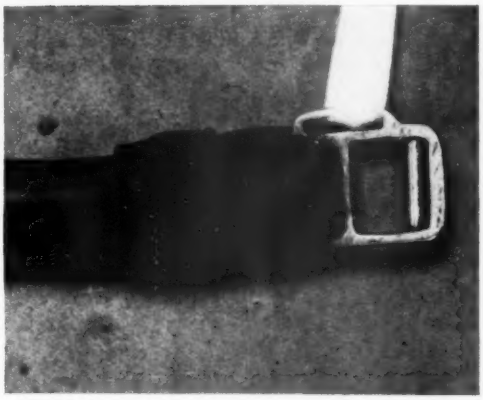

Fig. 1. Showing buckle of tourniquet, with slot for median tape and roller to allow of easy removal.

An operating neurologist should acquire the power of visualizing the brain, its main fissures, the insula, the ventricles, etc., through the intact skull; and those who have, by long practice, familiarized themselves with the rules of cranio-cerebral topography, learn to judge the position of the main fissures with no greater margin of error than when measurements are employed. Furthermore, as a large opening is to be made, an attempt to accurately determine on the scalp the point overlying a given centre, is to-day less essential than in the days when an attempt was made to approach it directly by a small overlying trephine opening.

Those who are less familiar with the relation of the superficial landmarks to the deeper structures, will need to mark out the main fissures by the aid of a craniometer, or by some one of the prescribed rules of measurement. As this is somewhat time-consuming many prefer, with an indelible pencil, to delineate these landmarks on the shaved scalp the day before. As a matter of fact, in osteoplastic work, even so delineated, these surface lines are not of great value particularly if the proposed flap is destined to include the Rolandic line; for most of the mark will be turned back with the flap, and the remaining fragment does not serve as a practical guide to the central fissure, even if it happens to have been accurately placed.

With the proposed flap thus outlined and the head raised by an attendant's hand placed under the back of the neck, a broad square of wet bichloride gauze is thrown over the entire head; over this, in turn, is placed a *tourniquet*.

For the *control of hæmorrhage from the scalp* numerous forms of tourniquet have been advocated. Many use a simple rubber tube, or Esmark bandage, both of which are difficult to apply and to fasten without slips in the aseptic technique. Crile has employed a rubber dam which, being stretched over the entire scalp, renders it bloodless. I formerly used a pneumatic tourniquet, but have finally come to a form of rubber ring in which is inserted a buckle (Fig. 1), so that the tube can be made into a ring of any size and can be easily removed at the end of the operation. Practice enables one, with a given quality of tubing, to estimate the size of the ring, necessary in a given case, to shut off arterial supply from the scalp without causing undue pressure. The ring, furthermore, is provided with a median tape (Fig. 2), whose length — measured after the head is shaved — should equal the

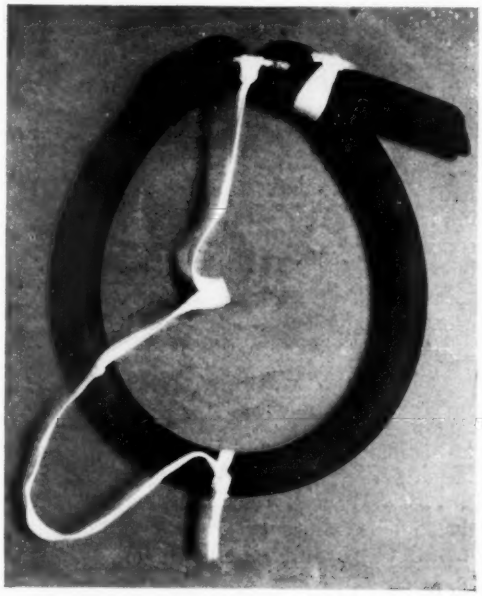

Fig. 2. Adjustable cranial tourniquet, with tapes applied.

Fig. 3. Showing application of tourniquet. Point diametrically opposite to buckle held below inion by assistant while circle is stretched over head, buckle being prevented by tape from overriding glabella.

distance from glabella to inion, and the object of which is to prevent the ring from rolling over the orbits, as it is likely to do, especially if there is a prominent forehead. Having been boiled, the ring is applied by the operator and an assistant (Fig. 3), being snapped over the head from occipital to frontal regions (Fig. 4).

In the majority of cases all bleeding from the scalp is thus controlled, though in certain patients with tumor, in whom there is marked intracranial stasis, some of the veins on the concave side of the incision which receive blood through emissary vessels from within the skull may have to be clamped. Special broad forceps have been designed for this purpose by Nicholson, Howzel and Chipault.

Other means of preventing loss of blood from the scalp have been advocated; as, 1. A preliminary ligation or clamping of the carotid; 2. The blocking by three mass tissue ligatures, including, respectively, temporal, occipital and supraorbital arteries; and 3. The enclosure of the proposed incision by a running suture passed through the scalp on each side of it with the purpose of leaving an anæmic strip of tissue (Heidenhain). They are not to be recommended.

Around and just above the tourniquet a small towel, folded lengthwise and wet in bichloride, is tightly pinned, and to this is securely fastened the large sheet which covers the etherizer like a tent and leaves exposed little more than the area outlined by the preliminary incision (Figs. 5-6). If there is any likelihood of the slipping of these surrounding sheets, they may even be pinned directly into the scalp. Thus can one be assured that there will be no break in technique from outside sources during what may prove to be a long operation.

Such details of preparation are of especial importance, I believe, in operations whose approach lies toward the base of the skull; for example, in the suboccipital or temporal operations to be described. In those situations away from the vault, the use of a tourniquet is, of course, impracticable, and as the operations may be prolonged, as in Gasserian ganglion work, or in the exposure of lateral recess tumors, it is essential that the exposed skin field, which may be only a few square inches in size, should be securely isolated from its questionably clean neighborhood.

The osteoplastic flap. With the operative field thus prepared, the incision is carried down to the skull, through gauze and soft parts, in the line previously scratched on the scalp. When the bone has been exposed it can be opened in a number of different ways.

It may be recalled that in the original operation described by Wagner the flap was outlined with mallet and a bayonet-pointed chisel; Chipault, Keen and

Fig. 4. Cranial tourniquet in position over gauze cap.

Fig. 5.

Fig. 6.

Figs. 5 and 6. Showing final preparation of operative field, with hood for anæsthetist.

others followed his lead. Dr. Keen long used a particular form of grooved chisel, with which the incision was quickly made through the greater thickness of the skull, the flap being finally loosened by a few strokes which served to break such portions of the inner table as had escaped division. Küster has recently devised a chisel of different form for the same purpose. Most operators object to these methods, on the score of possible concussion, even from the glancing blows which are given.

Toison, in 1891, suggested dividing the bone with a chain saw passed between primary trephine openings, so that *the bone should be cut from within outward*, and this remains, I think, a first principle to be employed, when possible, for all cranial incisions. Obalinski, in 1897, recommended for this purpose the flexible wire saw introduced, for obstetrical purposes, by Gigli [1] in the same year.

Similarly the bone may be cut between the primary openings by sawing with a straight hand-saw from without inward, and Doyen has devised a special saw with a guard for this purpose. It is a dangerous method in inexperienced hands.

Further, a linear cut from 2 to 3 mm. wide, of the full thickness of the bone, may be made with biting forceps of the Montenovesi or of the Dahlgren and De Vilbiss patterns. These instruments progress slowly, but they are almost certain not to injure the dura and have the advantage of biting outward, so that there is little, if any, jar to the brain.

There are, further, certain craniotomes which cut in a circular fashion by swinging the blade about a fixed point, and which may be used to incise scalp as well as bone. The Stellwag·n instrument has been highly praised by Philadelphia surgeons. A French instrument of similar type was described by Codivilla in 1900. Though no preliminary trephine opening is needed, these methods, likewise, possess the disadvantage of cutting from without inward, and as there is no guard, the dura is likely to be injured by these *craniotomes à mouvement circulaire*, unless the membrane is approached with the greatest caution.

The electromotor,[2] following upon its introduction into dental surgery, has been employed to furnish the driving power for a number of instruments which possess a circular or spherical form and so can revolve, such as burrs, trephines and circular saws, of which there are a number of patterns —Van Arsdale's, Powell's, Marsland's and Doyen's; and it has led to the invention of a revolving tool with spiral cutting edges, which is used by some operators. Cryer in 1898, Sudeck in 1900, and Sykes have all described instruments of the latter type, and while they are useful for certain purposes they possess the disadvantage, for osteoplastic work, of cutting such a wide slot that, when used for the entire incision, the replaced flap subsequently rests on the dura instead of on the bone edges.

In the Doyen type of motor there is a long, flexible arm between the motor and the revolving tool, which is thus driven from a distance as in the usual form of dental engine. Borchardt (1906) has made some

[1] Gigli's saw was merely an improvement on the *scie funiculaire* introduced by Kusy in 1876; this, in turn, having been a modification of the ingenious old chain saws devised by Aitken.

[2] It was the electromotor which made practicable the principles of Charrière's winding-machine (*scie à mollette*). Ollier's *scie à volant et à transmission élastique*, and Martin's four-handed brace and bit. The latter, in particular, though a hand-driven instrument, has all the accessories of the most modern equipment, including rotary saws and hollow mushroom-shaped burrs — tools more recently adopted and perfected by Doyen

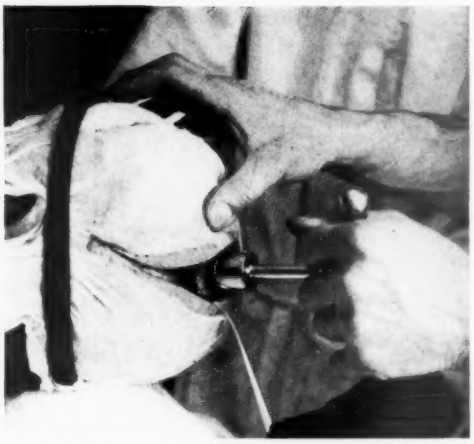

Fig. 7. Exposure of skull by retracting outer edge of incision downward to give room for primary large trephine opening at the posterior upper angle of proposed flap.

desirable modifications of this apparatus, and Bercut (1904) and Hartley (1907) have added the great improvement of having a cutting tool directly connected with the motor, which, weighing only eight or nine pounds, and being capable of sterilization, is itself held in the operator's hands. Hartley has also devised new forms of perforators with serrated edges.

Surgeons who use electromotive force for osteoplastic operations are able to work very rapidly, and, if this does not mean added risk of accident, it is most desirable. However, having witnessed in skilled hands, twice from a Doyen saw and once from a Cryer drill, what I regard as a most serious accident — namely, the division of bone and dura at the same time owing to the fact that the guide of the speeding instrument worked its way through the adherent membrane instead of separating it from the skull — I have clung to the somewhat slower, but certainly less dangerous operation by hand-driven instruments.

The "combined method," to be described, makes use of the following general principles: 1. Division of the bone between two or more primary openings (Toison). 2. Incision by an advancing instrument from a simple opening. 3. The making of all cuts from within outward. 4. The leaving of a beveled flap.

A primary opening through the thickest part of the exposed cranium, usually near the parietal eminence, is made with a hand-tre-trephine (Fig. 7), which should be of generous size, with a crown fully 2 cm. in diameter. I prefer a trephine of the Galt conical pattern with beveled sides (Figs. 8-9); it is the safest instrument and obviates the necessity of an extractor (*tire-fond*) for the button, for this can be tilted out owing to the width of the superficial cut. Bleeding from diploëtic vessels, in certain cases of tumor, may be severe; a fatal case, indeed, of this sort has been reported by Ransahoff. It may be controlled by the proper use of Horsley's wax, with which the beveled teeth of the trephine may be filled.

One or more secondary openings (one is usually sufficient) at the upper edge of the incision are made with a Doyen perforator and burr (Fig. 10). Then, with a long-handled blunt dissector or dural separator, introduced through the large trephine opening, the dura between these openings is freed from its bony attachments. On withdrawing the dissector the cerebral pressure, in most cases, suffices to hold dura against bone again, and thus serves to control such bleeding as may have been occasioned.

From these two primary trephine openings the lateral edges of the flap are then cut downward toward the base in a line concentric with the skin incision. The first half-inch of these lateral cuts is made with Montenovesi forceps (Fig. 12), which leave a 2.5 mm. incision, followed by the weaker Dahlgren forceps (Fig. 11) as the thinner bone near the temporal region is approached.

A Gigli wire saw is then passed on a guide, of which there are numerous forms, between the two openings and the mesial edge of the flap is cut on a broad bevel (Figs. 13 and 14)

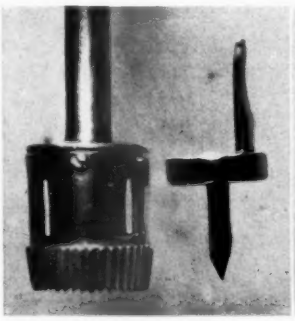

Fig. 8.

Fig. 9.

Figs. 8 and 9. Crown of beveled trephine with loose central pin, having thumb-piece to prevent its dropping out unless desired.

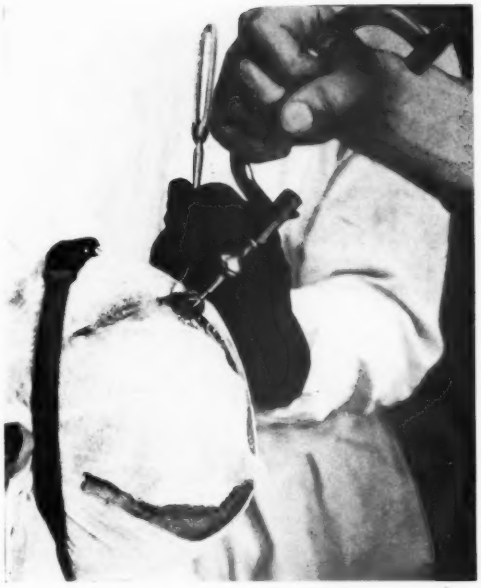

Fig. 10. Doyen burr, which should follow a perforator; in use during operation to make opening at anterior angle of proposed flap.

Fig. 11. Dahlgren forceps used for incision of lateral edges of bone flap, when approaching thinner portion of cranium in temporal region.

Fig. 12. Montenovesi forceps in use, starting lateral incision through thicker portion of calvarium.

Fig. 13. Showing Gigli wire saw in use for making beveled mesial edge of flap, with dural guard introduced through the two cranial openings.

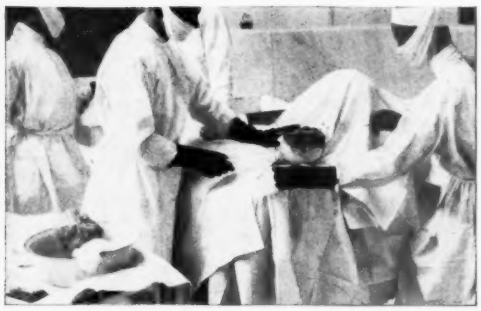

Fig. 14. Showing same stage of actual operation. Note dryness of field, owing to properly applied tourniquet.

(this is an important detail, for it enables the subsequent solid replacement of the flap without danger of its being driven inward by a snug pressure-bandage). The flap is then forced back by the insertion of blunt instruments around the edges, and is broken across at its base (Fig. 15).

As Hartley and Kenyon have emphasized, all flaps made on the cranial vault should radiate toward the temporal wing as a base, since this is the thinnest part of the calvarium, is most easily broken, and its covering of scalp is well nourished by the temporal vessels.

Fig. 15. Bone-flap reflected, exposing dura. Note broad bevel of upper edge of bone-flap.

Provided the flap includes the region of the pterion, the meningeal artery may be torn owing to its having channeled the broken bone. The vessel should be ligated at its lowest point of exposure by making at a distance a small opening in the dura, through which a grooved director can be inserted; on this the curved needle may be passed without danger of injuring even a tense cortex. Bleeding from the expansions of the lateral sinus, in case they have been exposed by a high flap, is best controlled by the pressure of sterile absorbant

Fig. 16. Osteoplastic flap and dura reflected. Note concentric rather than superimposed openings through scalp, cranium and dura.

cotton, pledgets of which I find to be as valuable, as a hæmostatic agent for the intracranial part of the work, as is wax for the bone itself. Horsley prefers hot saline or weak bichloride irrigations for this purpose.

The intracranial procedures. At this stage, if there has been a fall of arterial tension from loss of blood, the further progress of the operation, especially in tumor cases, may well be postponed for a second session. If there is no contra-indication on this score, the dura is opened in a line concentric with the bone incision (Fig. 16), leaving plenty of margin for subsequent suture. The membrane should be incised on a grooved director, especially if there is increased tension, for it is very important to avoid any possible injury to the pia-arachnoid. In case the tension is so great as to threaten this, a lumbar puncture should be performed at this stage of the operation.

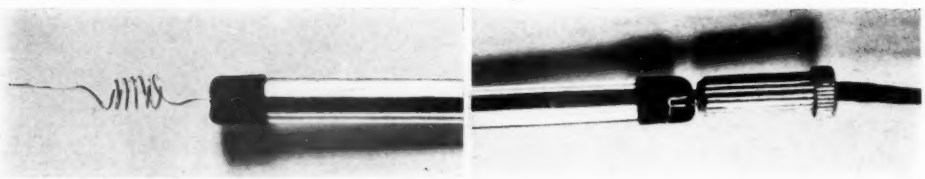

Fig. 17. Showing terminal and connection of author's electrode. (Natural size.) Instrument should be 16 inches or more in length.

The dural incision should not be made too near the median line, lest the edge of the parasinoidal expansions, or the veins entering them, be injured. If the mesial edge of the hemisphere is to be exposed it is best to open the dura in this direction by a separate radial cut, and if necessary to rongeur away some of the bone toward the median line. This is preferable to an attempt at exposure of the mesial edge (foot area) through the primary osteoplastic flap — a procedure usually attended with great loss of blood.

If the expected lesion is not disclosed and if the topography is not perfectly clear, the fissura centralis may have to be determined by faradization of the cortex. A long glass unipolar electrode (Fig. 17), carrying a fine platinum core coiled into a spiral at the end, according to Sherrington's plan, in order to obviate puncturing the pia-arachnoid, is used for stimulation. The other pole is attached to an extremity, preferably on the homolateral side. The current should be just strong enough to contract exposed muscle — some of the temporal fibres are usually available for this purpose. If there is an abundance of cerebrospinal fluid in the arachnoid spaces, it must be evacuated by pricking the membrane as it bridges the sulci, and further, the patient must not be too deeply under the anæsthetic. No motor cortex, unless there is complete degeneration of the pyramidal tract, fails to give responses if these precautions are observed.

If an incision of the cortex is necessary, whether for exploration, for extirpation of a given area in cases of focal epilepsy, or for the removal of a neoplasm, such cortical vessels as will evidently have to be divided must first be ligated on each side of the proposed incision, which should, if possible, be confined to the exposed surface of a convolution, and should not cross a sulcus. The finest strands of split silk, preferably black, should be used for these ligatures, and they should be passed around the vessels with delicate curved French needles, which are introduced and emerge in non-vascular areas. With these precautions, the subcortical manipulations can usually be conducted with but little loss of blood even in most cases of tumor extirpation. Tumors which have approached and involved the cortex must be surrounded by a similarly placed double row of ligatures, between which the incision is made. Subsequent dissections are carried out with blunt instruments, and the momentary pressure of cotton pledgets will usually check the oozing.

A brain which tends to protrude may sometimes be "dropped back" by elevation of the head and trunk, or by evacuating cerebrospinal fluid. This can at times be accomplished by pricking the exposed arachnoid spaces and by milking out the fluid; at other times a lumbar puncture may be necessary, and the removal of fluid in this way during the course of an operation is of the greatest possible help under many circumstances, being in large measure free from the dangers which attend a similar proceeding in the presence of great cerebral pressure when the skull is closed.

Closure. Unless there is reason for permanent decompression, in which case the dura somewhere should remain open, an accurate approximation of the membrane in its two layers should painstakingly be carried out, to prevent the formation of adhesions, or their reformation if they have been found and divided as the presumed source of irritative symptoms. If a large cerebral defect remains after the removal of a growth, or if the brain has receded from its normal level owing to evacuation of

Fig. 18. Showing method of closure of wound before removal of tourniquet.

cerebrospinal fluid, the space should be filled with warm isotonic salt solution before closing the dura.

The bone flap is solidly replaced and the scalp is, in turn, accurately approximated in a broad surface. It is well to draw together the galea aponeurotica by a few buried sutures before closing the outer layer. For the latter many use a continuous suture which has the advantage of speed. Inasmuch as the closure, in many cases, is completed before the tourniquet is removed, I feel the need of a more accurate and solid approximation; this is accomplished by rapidly placing about the incision a series of straight, round-pointed cambric needles which serve to keep the edges everted as each suture is tied, and thus to assure a ridge of tissue with a flat apposition, which prevents subsequent bleeding from the vessels of the scalp (Figs. 18 and 19). An approximation of the divided epithelial edges which is beyond reproach may be secured in this way.

Drainage is occasionaly advisable — perhaps in 20 per cent. of the cases — but it should be avoided if possible. It may be necessitated by constant oozing from the exposed parasinoidal sinuses; otherwise an extradural clot may form. Marion drains directly through the centre of the flap, in which a new opening must be drilled for the purpose. I prefer to take advantage of the trephine openings made in this method of resection at the upper angles of the flap. The drains, of cigarette form, covered with protective so that they may be easily withdrawn, are led out, not through the original incision, but through puncture wounds made in the scalp about 2 cm. to its outer side; this insures for the drain an oblique passage which can be occluded by pressure, in case there should be a tendency for cerebrospinal fluid to escape after their withdrawal. Kocher has devised small silver tubes for drainage in similar fashion, and they serve the purpose admirably.

The wound, covered with silver foil, is partly dressed and some pressure exerted before the

Fig. 19. Detail of method of closure. (Slightly magnified). Note ridge of tissue made by fine ligatures, which, when tied and locked to the side, should control all bleeding from scalp.

Fig. 20. Brain cyst, natural size, removed from patient shown in Figs. 21 and 22. Cyst wall not entirely degenerated. Area at upper third of figure proved to be about ½ cm. in thickness and showed sarcomatous tissue.

tourniquet is removed, after which an abundant dressing with an outer starched bandage is applied. The ears should be carefully protected with cotton to prevent discomfort from pressure.

The first dressing is made in forty-eight hours, when the drains, if used, and all the sutures are removed. The silver foil and its thin inter-leaved paper, wet with alcohol, dries into a crisp protection which is particularly ideal for a head dressing.

The method of temporary cranial resection was devised to obviate a subsequent defect in the scull, and though I do not believe that even large cranial defects are necessarily harmful, they are certainly undesirable if a satisfactory exploration is possible without leaving them. For, on the one hand, should there be no increase or only a temporary increase of cerebral tension, an unsightly depression may be left in correspondence with the defect; whereas, on the other hand, if there is a permanent increase of tension, as in cases of tumor or obstructive hydrocephalus, there will be an unsightly protrusion.

It is in these cases of increased tension, particularly those due to tumor, that operative judgment is put to its greatest test. The accessibility and removability of a cerebral

Fig. 21.

Fig. 22.

Figs. 21–22. Patient two weeks after operation for removal of large degenerated (cystic) subcortical sarcoma (of Fig. 20). Bone removed in this case through misjudgment, leaving large area of flattening, shown in figure to the right.

tumor can rarely be determined before the hemisphere is exposed. In the average case what course therefore shall we pursue? It is Horsley's custom, I believe, in consideration of the desperate nature of most of these cases and the trying detail of making a bone flap, to quickly break out and permanently remove the bone from a large area over the supposed site of the growth at his first stage operation, opening of the dura being reserved for a second sitting. If at this second-stage performance, with an opened dura, a growth should not be disclosed or should be disclosed and found to be inoperable, it would usually be impossible, even if desirable under these circumstances, to resuture the dura; impossible also, in many cases, even to close the scalp again unless the bone has been removed. The tension indeed may become so great, from subsequent hæmorrhage or œdema, as to force open even a carefully united scalp and lead to a fungus; even should this not occur a large hernia may develop. If on the other hand a tumor should be found and prove to be removable, a preserved bone flap might have been replaced.

I have recently been misled into a needless removal of the bone in a patient whose case, owing to the extreme tension, I deemed hopeless at a first-stage operation; for at the second sitting, with an open dura and the brain dropped back by lumbar puncture, a large cystic tumor (Fig. 20) was successfully extirpated, and I would have been glad not to have the patient leave the hospital with this huge defect (Figs. 21-22). It may be said, in passing, that I have never seen a bone flap lose its vitality, and indeed in one case reported with Dr. Thomas the flap was for one reason or another elevated on six occasions and a tumor finally removed at the last sitting.

My own experience does not accord with Frazier's, in that removal of bone alone, without opening the dura, will suffice for decompressive purposes in cases of tumor, and believing that a dural opening is always necessary I have come to make this opening in a situation where the protrusion will be protected — under the temporal muscle in cerebral, and under the occipital muscle in suspected cerebellar lesions.

It is oftentimes hard to decide upon the best course of procedure in individual cases, and I have tried in various ways to circumvent the difficulties which may arise. In some patients a primary decompressive operation has been made under the temporal muscle — preferably upon the same side as the lesion — and the more serious exploratory operation deferred for a subsequent sitting. Indeed, in lesions of obscure situation, this is always desirable, but I refer more particularly to those which have produced more or less definitely focalizing symptoms. In a number of cases I have carried out a combined osteoplastic and decompressive operation which I was first forced into in a patient operated upon in 1903.

In this patient a large bone flap had been turned down to expose the right motor strip, owing to a contralateral hemiplegia. A huge infiltrating glioma was exposed, unquestionably inoperable. Though the dural opening was large, the hemisphere and growth bulged markedly, the protrusion doubtless leading to hæmorrhage into the vascular tumor owing to rupture of its poorly supported intrinsic vessels. It was impossible, under the existing circumstances, to resuture the dura or replace the flap.

Consequently, at the base of the flap the thin portion of the bone was rongeured away, not only on the flap side, but also well down to the base of the skull opposite to it — in other words, most of the bone, as in the usual subtemporal decompressive operations, was removed from under the temporal muscle. The dura was then freely opened in this low situation, and this allowed, by outward dislocation of the brain there, its partial reposition at the upper edge of the original dural opening, which could then be closed.

In this way a marked protrusion, possibly a breaking down and fungus, was prevented and an operative calamity averted. The experience taught two things which have been helpful to me since: I. *The principle*

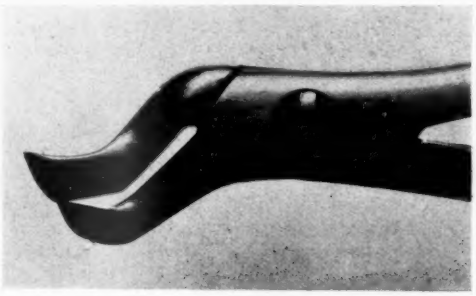

Fig. 23. Jaws of cutting forceps for incision of thin cranium in the new born.

Fig. 24. Photograph taken four days after ganglion operation, to indicate situation of scalp incision in temporal region. As shown, incision should be practically invisible. Its angles are indicated by crosses.

of dislocation which is permitted by a large cranial and dural opening; and II. *The danger of decompression directly over a vascular growth.* The latter, I think, is not fully appreciated, for surgeons who have written on the subject advocate decompression, if possible, directly over a tumor — a proceeding which may promise to be more immediately efficacious in relieving tension, but which often leads to a large hernia if scalp alone covers the growth, and which may be the occasion of hæmorrhage as it was in this patient.

It is not always necessary to leave a beveled flap; indeed, it is not always possible. For example, in the thin skulls of infants, more especially in the new-born, it is not practicable, owing to the thinness of the bone; hence in these patients the flap is usually made throughout by a biting tool (Fig. 23), modeled on the Montenovesi pattern, which makes without jar a clean incision 8 mm. long by 2 mm. in width. It is an instrument which can progress very rapidly in these thin skulls.

Fig. 25.

Fig. 26.

Figs. 25–26. Photographs of patient ten days after decompressive operation for tumor. Note curvilinear incision, with slight protrusion; also that partial shaving of head is all that is necessary.

Fig. 27. Showing extreme degree of protrusion possible after subtemporal decompression. Case of obstructive hydrocephalus from subtentorial tumor; pressure symptoms consequently not entirely relieved.

In the yielding skull of the new-born, I formerly experienced difficulty in making, safely and easily, the primary opening through which the forceps could be introduced and the bone incision started. The usual scalp incision in these cases is made within and concentric with the edge of the parietal bone, and I have found the most convenient means of entry is to scrape back the epicranium at one point, to the serrated edge of the growing parietal, where the pliable bone can be turned back and the incision begun.

Including the four cases cited in my original report in 1905, I have had ten operations for intracranial hæmorrahge in the new-born, four of the patients remaining alive and well.

OPERATIONS WITH REMOVAL OF BONE

I have thus far in the main considered only those forms of craniotomy in which a flap has

Fig. 28. Fig. 29.

Figs. 28–29. Photographs taken three weeks after decompressive operation with curvilinear scalp incision, for pressure symptoms due to the œdema of nephritis. Note partial shaving of head, allowing patient to conceal shaved area by parting hair on opposite side.

been made and then replaced. There remains a large number of operations — craniectomies — in which it is either impossible or inadvisable to attempt an osteoplastic resection.

SUBTEMPORAL OPERATIONS. Many of these operations are characterized by the removal of more or less of the thin cranial wall underlying the temporal muscle, whether they are conducted for purposes of exploration, usually in traumatic cases; for purposes of decompression, in states of increased intracranial tension associated with tumor, hydrocephalus or œdema of one source or another; for the removal of growths or natural structures like the Gasserian ganglion, lying in the mid-cerebral fossa; or even for the still deeper exposure of the 3rd ventricle or the pituitary body. Not only is it difficult in this situation to make a satisfactory osteoplastic flap, but the precaution is unnecessary if proper use is made of the temporal muscle, fascia and galea in the closure.

In all of these operations, with a perfect technique and abundant experience in the proper disposition of gauze, towels and sheets, a small portion only of the head need be shaved (Figs. 25 and 28).

A tourniquet cannot be used in this low situation, but pressure of a finger on the temporal artery as it crosses the zygoma allows the vessels to be picked up in the scalp, after their division, without undue loss of blood. Otherwise, the preliminary preparation, the subsequent precautions in regard to securing a small, isolated and well protected field in which to work, the administration of the anæsthetic on the operating table, and other details, are the same as those which have been described under osteoplastic operations.

The steps of a subtemporal craniectomy, however, differ somewhat, particularly in the manner of approach through the temporal muscle, according to the nature of the case, whether (1) a ganglion operation, (2) a decompression for tumor, or (3) an exploration in cases of cranial trauma.

1. In the *Ganglion Operation* — Here the muscle fibres must be divided and scraped away from the bone well down to the base of the temporal fossa, in order, after making the small cranial opening, to give direct access to the base of the mid-cranial fossa without undue elevation of the temporal lobe. The operation is, of course, conducted outside of the dura, the subdural space being opened with escape of cerebrospinal fluid only when the sensory root is liberated and withdrawn from its pontine attachment.

At the present writing I have performed sixty-eight of these operations and have ceased to regard them as particularly difficult — no more difficult, indeed, than many of the extracranial procedures which are advocated and which give no certainty of permanent relief in cases of major neuralgia. Two of my early patients I lost through inexperience; in the last forty operations there have been no complications of any sort.

The small curvilinear skin incision (Fig. 24), entirely within the hair margin, should be placed so as to avoid division of the upper branch of the facial nerve which innervates the occipito-frontalis muscle (pars frontalis). The muscle itself should be divided as in the older operation in horseshoe-shaped fashion, and scraped away from the bone so as to bare the lower part of the fossa. I still think it is essential for more reasons than one to remove the zygomatic arch, and this can be done by crowding forward the periosteum and fascia

from the point at the temporal attachment of the zygoma where it is crossed by the incision, without risk of injuring the aforementioned twig of the N. facialis.

If the soft parts are painstakingly closed in layers — muscle, fascia, galea and skin — there will be no apparent sinking in of the temporal region in consequence of atrophy of the muscle. A drain is rarely needed. Without tests for sensation it should be impossible to tell subsequently, by inspection alone, upon which side the neurectomy has been performed. Experience first, patience second, and a proper kit of spatulæ and blunt dissectors third, are in descending sequence the essential requisites for success in carrying out this delicate operation.

2. *The Subtemporal Decompression for Symptoms of Increased Intracranial Tension.* Here I think it is wise to make a curvilinear skin incision, more or less concentric with the temporal ridge or line of attachment of the temporal muscle (Figs. 25-26). A flap of scalp alone should be reflected with careful preservation of the stout galea-aponeurotica, which in turn should be incised and reflected laying bare the temporal fascia. This fascia is then incised in line with its fibres in about the middle of the muscle. While the edges of the split muscle are carefully held apart, its attachments, together with the pericranium, are separated by an elevator from the bone under the entire muscle belly.

The bone is then entered in any way desired — I prefer a Doyen perforator and burr, followed by Montenovesi forceps, and then by Horsley rongeurs as the opening is enlarged. The chief difficulties lie in the fact that the muscle cannot be elevated far from the skull without tearing it — an undesirable accident in view of the subsequent closure. Hence it is necessary to have a special form of retractor, as well as flat-bladed rongeurs which can be introduced far under the muscle and which will bite away the thin plates of bone without jar. Care must be taken not to injure the meningeal artery, not to tear the tense dura by a sharp spicule of bone, and above all to avoid cerebral contusion by rough manipulations with the rongeur forceps.

A generous area of bone having been removed, it remains to slit the dura in stellate fashion to the edge of the opening. In cases of great tension this is often a difficult thing to accomplish without injuring the pia-arachnoid — an accident which may lead to very undesirable consequences. One can usually estimate the degree of tension by palpation, but if this is not conclusive a very small entering incision is made. If the brain tends to forcibly protrude, especially if it is dry and there is no escape of fluid with resultant lowering of tension, a lumbar puncture should be performed in order to accomplish this end.

A dangerous, at times fatal, procedure, as I have often reiterated, when the cranium remains closed and cerebral tension is great, lumbar puncture and withdrawal of the cerebrospinal fluid from below loses its hazardous features after the cranium has been opened. In these cases it is often of the greatest aid, for the tension usually recedes sufficiently to allow the free opening of the dura without risk of injury to the leptomeninges and cortex. In more than half of my subtemporal decompression cases for tumor — now nearly sixty in number — lumbar puncture has been resorted to at this stage of the operation.

In this operation, again, the wound is painstakingly closed in four layers — muscle, fascia, galea and skin. There results more or less protrusion under the closed muscle, though never a large hernia such as one sees in cases of decompression protected by scalp alone. Even in the presence of a particularly tense cerebrum there is little risk of the wound reopening in consequence of pressure if there has been a secure closure with careful approximation of muscle and fascia. Though such an accident has never happened, it is to lessen this risk that the curvilinear scalp incision is preferred in these cases to the oblique incision used in the traumatic cases.

In the long run, for all cases of inoperable or inaccessible cerebral tumors, this, in my experience, has proved to be the most satisfactory method of decompression, as shown not only by the lessening of discomforts but by the most delicate of tests, the condition of the eye-grounds — a matter that will be considered fully by Dr. Bordley and myself at some future time.

Fig. 30. Case of fracture of the base at time of first dressing. Cross hatching of sutures which have just been removed is apparent. Note situation of drain, which has been withdrawn from lower angle of incision where edges are gaping.

There is one group of cases which are an exception and which do not receive much benefit from temporal decompression alone — namely, those in which the condition is complicated by a hydrops ventriculorum due most often to closure of the iter by the pressure of a subtentorial growth (Fig. 27). I am comforted, however, by the belief that a way has been found of meeting the difficulties of such an obstructive hydrocephalus, but I prefer to delay its description until further opportunities of putting it into practice have demonstrated its actual value. Thus, although a subtemporal decompression is not always effectual in relieving the symptoms of pressure, it may be said that there have been no fatalities in our rather large series of cases.

Not only for tumor, but for other conditions of tension, will a subtemporal decompression prove to be often a helpful, sometimes a life-saving, measure. Among these conditions may be mentioned thrombosis or embolism; for when there is a large area of cerebral softening, the lesion, in consequence of œdema, may lead to great swelling. I have decompressed five of these cases, three of the patients apparently near the terminal stage of compression: all of them have recovered.

Other states for which the operation is suitable are intracranial syphilis — for the cessation of headaches and vomiting enables a subsequent antileutic régime to be much more efficaciously carried out after the decompression — and many forms of œdema, more particularly in acute serous meningitis and in the œdema of nephritis. Of the latter I have had one remarkable case (Figs. 28-29) — a young woman, in a profound uræmic state, not benefited by numerous lumbar punctures, who regained consciousness after the operation and left the hospital better than she had been for many months, practically free from headaches and vomiting, and with an extraordinary improvement in, though not a complete subsidence of, her so-called "albuminuric retinitis."

3. *The Temporal Exploration in Traumatic Cases.* Particularly in bursting fractures of the skull with general pressure symptoms and no external indication of the character and situation of the cerebral lesion, no site for an exploration is so likely to disclose the seat of trouble as one in the temporal region, and no form of operation is so likely to meet the needs of the conditions usually found as the "split-muscle" operation with removal of bone.

As drainage is often indicated in these cases, I prefer to make the skin incision parallel to the line of muscle fibres (Fig. 30), there being less need here for a protecting flap of scalp since the pressure of the traumatic œdema is an acute process which subsides in the course of a few days. Otherwise the operative approach to the lesion is similar to that in the tumor cases.

The advantages of such an operation in these patients may be briefly summarized as follows: An opening in this situation will disclose the extradural clot of a ruptured meningeal, if this vessel or one of its branches as is so often the case has been injured by a meridional fissure; similarly, this is the most common situation for an isolated subdural clot to be found; again, in bursting injuries associated with cortical laceration, it is the tips of the temporal lobes which are most often affected; further, in the larger number of basilar fractures the fissures run into the middle cranial fossa, and hence free bleeding from the base may be most effectively drained by placing a protective wick under the temporal lobe and leading it out at the lower angle of the split-muscle incision; lastly, since a post-traumatic

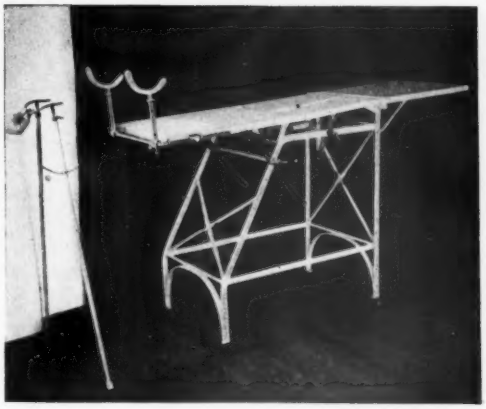

Fig. 31. Showing table with outrigger shoulder supports and unattached crutch for head; for use in suboccipital and high spinal operations.

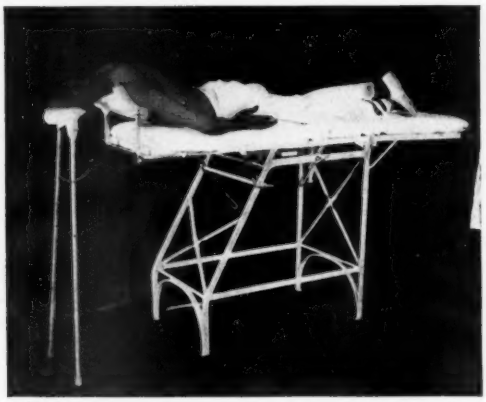

Fig. 32. Showing patient in position on table for cerebellar or high spinal operations.

period of œdema, which endures for some days after the injury (the wet brain of our predecessors) and which through pressure may prove serious in an unopened skull, is usual in these cases, the subtemporal opening serves to ward off almost completely the disturbances which otherwise appear. The operation itself is simple and it is often desirable to carry it out bilaterally.

SUBOCCIPITAL OPERATIONS. For the exposure of subtentorial lesions — tumors of the cerebellum or lateral recess, a basilar meningitis to be drained, the freeing of adhesions about the 4th ventricle resultant to an old inflammation, etc.— the principles of tourniquet and bone-flap are inapplicable, just as in operations conducted through the temporal region. In this situation, also, owing to the possibility of subsequent firm closure under muscle there is little reason for preservation of bone.

Though many surgeons place the patient on the side for these operations, I much prefer a symmetrical face-down position particularly since I regard a bilateral exposure as desirable in all cases. A face-down posture, however, interferes greatly with respiration unless the shoulders are held away from the table to allow of free costal movements; consequently a table outrigger has been devised for these cases, possessing shoulder supports and a separate crutch with a horseshoe-shaped top in which the head comfortably and securely rests (Figs. 31-32). It gives a remarkably solid base for operative work, and the head may be raised or lowered, flexed or extended, by changing the position of the crutch. The anæsthetic is sprayed against a mask attached under the "horseshoe." This outrigger has been used for the past three years in all suboccipital work with the greatest satisfaction.

In order to fully benefit from the "principle of dislocation" mentioned under osteoplastic operations, a bilateral exposure of both cerebellar lobes is desirable to allow of the outward dislocation of the lobe on the opposite side during the manipulations of the other. This will permit of sufficient displacement to freely expose a cerebello-pontine tumor, for example, without the necessity of excising cerebellar tissue or, indeed, of injuring it in any way. For this symmetrical approach I find it advantageous to make, in addition to the usual curvilinear cut over the occipital ridge, a median incision with division of the soft parts not only down to the occiput but to the spinous processes of the upper cervical vertebræ. This "cross-bow incision" gives an exceptional view, owing to the possibility of lateral reflection of the flaps. A fringe of muscle and aponeurosis, together with the galea, is carefully preserved at the upper edge for subsequent union by suture with the reflected muscle flaps.

Primary openings having been made in the bone thus laid bare, they are enlarged with rongeurs, upward so as to expose the lateral sinuses on each side, across the median line avoiding the bone over the torcular, and then downward so as to include the posterior half of the foramen magnum. The dura is then widely opened and the mid-occipital sinus, if present, is ligated.

Owing to the possibility of cerebellar dislocation a wide area of exposure, either of the 4th ventricle or of the structures in the cerebello-pontine angle, is obtained through this large defect; and it is desirable furthermore not only for exploration but for purposes of decompression when subtentorial tumors prove to be irremovable. There are certain points in the bone where hæmorrhage may be met with in these operations, and especial care must be taken at the torcular and at the posterior margin of the mastoid processes. During the deeper manipulations, a large vein which bridges the subdural space at the side of the cerebellum is often encountered, and injury to it should be avoided if possible.

As foretold in my opening paragraphs, it has been my endeavor merely to picture some of the technical steps in these, the commoner cranial operations, in the hope that some operators, who may have had less opportunity for neurological work and whose interests nevertheless lie in this direction, may profit by some of my experiences. There are many of the more difficult procedures, as the operations on the pituitary body, drainage of the 3rd ventricle, extirpation of the Gasserian ganglion, removal of deep-seated tumors, operations for apoplexy and the like — the more dangerous and critical of the modern cranial operations — which for the time being and until their veriest detail is established on an unquestioned basis should rest in the hands alone of those specially trained, not only in neurology, but in the particular conduct of cerebral operations. The advance of operative neurology is greatly impeded by the prevailing impression in regard to its dangers and general futility — an impression due in large measure to the often reckless attempts made in this difficult branch of surgery by the untrained and inexpert.

FIBROMYOMATA UTERI

A Study of the Degenerations, Complications, and Associate Conditions in Three Thousand Five Hundred and Sixty-one Cases

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THE traditional teaching that fibromyomata uteri are innocent tumors, that they seldom produce symptoms, that after the menopause they become smaller or even disappear, and that in rare instances only do they cause death has been discredited. The fallacies of such a teaching have been proven by a systematic pathological study of the changes and degenerations which take place within the tumor or uterus, by a consideration of the complications and associate conditions, and also by the constitutional changes which take place in conjunction with these tumors.

The men who have worked on this subject have been so energetic in their efforts to disprove the traditional teaching, that they have gone to the other extreme and advocate that all fibromyomata uteri should be removed when diagnosed. Although many valuable papers have appeared during recent years in which the radical view has been advocated, the majority of surgeons doubt the correctness of such a policy, and make the criticism that the dangers of these tumors have been overestimated, because many independent conditions have been classified as complications.

In this paper I shall endeavor to present the subject in a fair and impartial manner and shall draw such conclusions as the statistics seem

to warrant. The larger the number of cases studied, the more valuable are the statistics and the more likely to be correct are the conclusions drawn. For this paper I have analyzed a series of 3,561 consecutive cases which have been reported by the following authors:

Martin	205	Lauwers	200
Noble	337	Eastman	117
Cullingworth	100	Webster	210
Frederick	125	Martin, F. H.	209
Scharleib	100	Cazenare	144
Watt-Keen	300	Giles	150
Hunner	100	Sarwey	360
McDonald	280	Jacobs	633
Total			3,561

The degenerations and changes in the tumor and uterus in 3,561 cases are as follows:

Necrosis of tumor	197	4.9%
Myxomatous degeneration	160	4.0%
Hyaline degeneration	72	1.8%
Hyaline degeneration and calcareous infiltration	12	
Cystic degeneration	141	3.5%
Calcareous infiltration	123	3.4%
Carcinoma corporis uteri	63	1.7%
Carcinoma cervicis uteri	25	.7%
Sarcoma	54	1.5%
Chorioepithelioma	2	
Œdema of tumor	23	
Fatty degeneration	12	
Hemorrhagic degeneration	16	
Hemorrhage into tumor	2	
Twisted pedicle, pedunculated tumor	6	
Torsion of tumor	1	
Incarceration of tumor	5	
Intraligamentous development of tumor	172	4.8%
Subvesical development of tumor	2	
Adenomyoma	19	
Adenoma of corporeal mucosa	34	
Polypoid degeneration of the mucosa	6	
Total	1,147	

In this series of 3,561 cases of fibromyomata uteri, there were recorded 1,147 degenerations and changes in the tumor and uterus. The question arises, did the 1,147 degenerations take place in a definite number of specimens or does it mean that 1,147 patients possessed tumors which had undergone degeneration. The question cannot be answered because the authors did not state which was meant. From the large number of degenerations reported by some writers, I am inclined to believe that the 1,147 does not represent that many patients.

It is a well-known fact that a patient may possess a uterus and tumor which shows two or more varieties of degeneration. If each variety of degeneration be tabulated under a separate class, it will readily be seen that the number of patients suffering from degenerated tumors is decidedly less than we are led to believe. A knowledge of the manner in which the degenerations are tabulated is most important if an attempt be made to estimate, with any degree of accuracy, the mortality which would result in these cases if the patients were not subjected to operation. For example, a uterus might contain a necrotic fibroid and a carcinoma of the fundus and be associated with an ovarian cyst, a combination not unknown, any one of which would cause death if the patient were not relieved by surgical intervention.

Among the conditions which may be considered complications in this series of 3,561 cases, are the following:

Conditions arising from inflammation:

Adhesions to viscera	97
Adhesions to tumor	5
Adhesions to omentum	6
Adhesions to ovary	3
Adhesions to bladder	1
Adhesions, universal	4
Chronic pelvic peritonitis	7
Exudate	3
Total	126

Conditions arising from pressure of tumor:

Ascites	7
Dilated ureters	2
Hydronephrosis	3
Intestinal obstruction, chronic	7
Intestinal obstruction, acute	2
Total	21

Conditions arising from miscellaneous causes:

Hemorrhage into abdominal cavity	3
Dangerous uncontrollable hemorrhage	41
Total	44

AGE AT WHICH DEGENERATION TAKES PLACE

In a series of 506 cases (taken from the reports of the Kensington Hospital for Women from 1893 to 1906 inclusive, and from the papers of Cullingworth and Scharleib) in which the ages of the patients were given, the

degenerations took place, divided into decennial periods, as follows:

Myxomatous degeneration	
Under 30	0
30 to 40	6
40 to 50	4
Total	10

Calcareous infiltration	
Under 30	0
30 to 40	1
40 to 50	0
50 to 60	1
60 to 70	3
Total	5

Cystic degeneration	
Under 30	1
30 to 40	5
40 to 50	5
50 to 60	1
60 to 70	3
Total	15

Necrosis of tumor	
Under 30	2
30 to 40	8
40 to 50	11
50 to 60	4
60 to 70	2
Total	27

Œdema of tumor	
Under 30	2
30 to 40	10
40 to 50	11
50 to 60	5
Total	28

Hyaline degeneration	
Under 30	0
30 to 40	0
40 to 50	3
50 to 60	1
Total	4

Carcinoma cervicis uteri	
Under 30	0
30 to 40	1
40 to 50	2
50 to 60	1
Total	4

Sarcoma	
Under 30	0
30 to 40	1
40 to 50	3
50 to 60	0
60 to 70	2
Total	6

Carcinoma corporis uteri	
Under 30	0
30 to 40	0
40 to 50	0
50 to 60	1
60 to 70	1
Total	2

Hyaline degeneration and necrosis	50 to 60	1
Hyaline degeneration and œdema	40 to 50	1
Myxomatous degeneration and calcareous infiltration	40 to 50	1
Calcareous infiltration and necrosis	30 to 40	1
Fatty degeneration	40 to 50	1
Inflammation	30 to 40	1
Carcinoma	60 to 70	1
Necrotic carcinoma	40 to 50	1
Malignant change	40 to 50	1
Adenocarcinomatous degeneration	30 to 40	1
Epithelial degeneration	60 to 70	1
Necrotic or sarcomatous degeneration	50 to 60	1
Calcareous infiltration, necrosis, adenocarcinoma of fundus	50 to 60	1

The age at which the degeneration took place in this series of 506 cases varied from twenty-three years to sixty-eight years. Of 114 cases in which degeneration took place 74, or 64.9 per cent, occurred after the age of forty years. These findings are in accord with the teachings of Giles, who states, "Age does not materially influence the character of tumors (fibromyomata uteri), except in the matter of degenerative changes which are strikingly absent before the age of forty years."

DEGENERATIONS

Necrosis was recorded in 197, or 4.9 per cent, of the cases, being the most frequent degeneration noted and also one of the most dangerous as regards the life of the patient. Necrosis is most likely to take place in submucous, subserous, pedunculated tumors, and also in tumors which have undergone calcareous infiltration. Myxomatous degeneration was noted in 4 per cent of the cases; cystic degeneration in 3.5 per cent of cases; calcareous infiltration in 3.4 per cent of cases. Intraligamentous development of the tumor was noted in 4.8 per cent of the cases. Although intraligamentous and subvesical development of the tumor are classified with the degenerations and changes in the tumor and uterus, they should more properly be considered as complications from the standpoint of the operation.

MALIGNANCY

Carcinoma corporis uteri was recorded in 63, or 1.7 per cent, of the cases. That there is an intimate relation between fibromyomata uteri and carcinoma corporis uteri is the belief of many surgeons. Sarcoma was noted in 54, or 1.5 per cent, of the cases. Carcinoma cervicis uteri was noted in 25, or .7 per cent, of the cases. When carcinoma cervicis uteri is found in conjunction with fibromyomata uteri it is probably a mere coincidence as there has been but little evidence offered and no proof produced that the condition is caused by the fibroid tumor. Although carcinoma cervicis uteri and chorioepithelioma are classified with the degenerations they should more properly be put with the associate conditions. Chorioepithelioma was found in two cases. In this series of 3,561 cases malignancy, including carcinoma cervicis uteri was recorded in 144, or 4 per cent, of the cases. Not including carcinoma cervicis uteri malignancy was found in 3.34 per cent of the cases. Lewis, in a study of 1,551 cases of fibromyomata uteri,

found that malignancy was present in 4.62 per cent of the cases.

In this series of 3,561 cases, the following conditions, due directly to the presence of the fibroid tumor, would probably have resulted fatally had the patients not been subjected to operation:

Necrosis of tumor	197	
Carcinoma corporis uteri	63	
Sarcoma	54	
Dangerous uncontrollable hemorrhage	41	
Twisted pedicle, pedunculated tumor	6	
Incarceration of tumor	5	
Torsion of tumor	1	
Intestinal obstruction, chronic	7	
Intestinal obstruction, acute	2	
Total	376	10.5%

Carcinoma cervicis uteri and chorioepithelioma are not included because they are considered associate conditions. There is no doubt but that a few cases of cystic and myxomatous degeneration would progress and probably increase the mortality 2 or 3 per cent, thus making the mortality without operation from 12 to 14 per cent.

The conservative surgeons recommend that fibromyomata uteri should be removed only when they produce symptoms. The surgeons who take the radical view, that all fibromyomata uteri should be removed when diagnosed, assert that women do not present themselves nor do they submit to vaginal examination unless they have symptoms and suffer. Therefore, of all patients who are known to possess fibromyomata uteri only about 12 to 14 per cent of those who have symptoms and suffer, would die from the degenerations and complications which result from these tumors if not relieved by surgical intervention.

Many of the associate conditions would produce death if the patients were not subjected to operation, but they should not be added to the estimated mortality of fibromyomata uteri, because they are independent lesions and in no way connected with the tumors except that the conditions coexist.

PHLEBITIS, THROMBOSIS, AND EMBOLISM

Phlebitis, thrombosis, and embolism are conditions which occur more frequently after operations for fibromyomata uteri than from any other surgical condition. The pathology of these conditions is not clearly understood, but it is probable that they are due to changes in the blood, changes in the blood vessels, and changes in the rate of the blood current.

Baldy in a series of 3,413 operative cases had nineteen patients die suddenly, thirteen of the deaths occurred in 366 cases of fibromyomata uteri. The deaths were diagnosed as follows: Cardiac 13, pulmonary 4, cerebral apoplexy 2.

Mallet had six sudden deaths in a series of 1,800 laparotomies; in 3 of the 6 cases the operation was performed for fibromyomata uteri. In 20 fatal cases of embolism in gynecological disease, collected by Kessler, 40 per cent were in patients suffering from myomas.

Fredericks, in a series of 125 cases of fibromyomata uteri, had eight post-operative deaths as follows: Cardiac embolism 2, pulmonary embolism or œdema 6. In a series of 463 operations for fibromyomata uteri, at the Tubingen Clinic, there were four deaths from pulmonary embolism.

Schenk reported 48 cases of phlebitis in 7,130 patients, operated upon at the gynecological clinic at the Johns Hopkins Hospital. Nineteen of the number occurred in cases of fibromyomata uteri. The number of operations for fibromyomata uteri was not stated.

CARDIO-VASCULAR CHANGES

During recent years more and more attention has been called to the cardio-vascular system, until now it is generally recognized that the changes take place in the heart and blood vessels in a large percentage of cases in conjunction with fibromyomata uteri. In 1884 Hofmeier called attention to cardiac disease in cases of abdominal tumors, and especially to fibromyomata uteri of large size. In 1888, Fenwick reported 22 deaths from cardiac degeneration, following operation for abdominal tumors.

Strassman and Lehman in 71 carefully recorded consecutive cases of uterine myomata, found that 40.9 per cent showed subjective symptoms and objective signs of organic heart lesions. In some cases the tumors were very small. Veit noted the frequency of asthmatic attacks in young women with relatively small

tumors and suggested that the attacks were suggestive of uterine myomata.

Webster in a series of 210 cases of fibromyomata uteri subjected to operation, found that cardio-vascular symptoms were present in about 25 per cent of the cases. Williams reported the findings in 22 autopsies in women with uterine myoma as follows: Valvular disease, mostly chronic, 6; fatty degeneration, 5; hypertrophy and dilatation, 3; atheroma of aorta, 3; small heart, 1; normal, 12. Wilson, in 10 autopsies of women dying from uterine myomata, found myocardial degeneration in 4 cases. He also reported that in 72 cases, in which radical surgical intervention was indicated, there were cardio-vascular disturbances in nearly 46 per cent of the cases. They were as follows: Adherent pericardium, 1; valvular disease, 6; myocardial affections, 14; murmurs (probably hemic), 12. Among 6 deaths in 427 operations for fibromyomata uteri Jacobs had the following: Cerebral hemorrhage, 1; cerebral anæmia, 1; embolism, 2. Boldt, in a series of 79 cases of fibromyomata uteri, found circulatory disturbances in 37, or nearly 47 per cent, of the cases. In this series of 3,561 cases, cardio-vascular changes were recorded only 32 times, which indicates that little attention was paid to this condition.

Baldy was probably correct when he made the statement that, "Fibroid disease of the uterus is not a local disease alone, but that the process is practically a general one in that it involves organs, how many and to what extent and how early we are unable to tell." The large number of cases in which fibromyomata uteri and visceral degenerations are associated, suggests that they may be caused by a common factor, and that by operation we can cure only the local condition and save the 12 or 14 per cent of patients who would die from the degenerations in and the complications caused by the tumors; diseased blood vessels and crippled organs cannot be restored by a myomectomy, a hysterectomy, or any other pelvic operation.

URINARY ORGANS

Many cases of fibromyomata uteri are accompanied by symptoms in the urinary organs. Probably the most usual condition is frequent micturition. In some cases there is inability to pass the urine, in other cases there is marked pressure upon the ureters, which results in hydronephrosis and degenerative changes in the kidneys.

In 210 cases of fibromyomata uteri reported by Webster, urinary disturbances were present in 30 per cent of the cases as follows: Deficient amount of urea, and the presence of albumin, casts, and oedema of the feet. Webster believes that the renal disturbances are produced by the same factors as those of the cardio-vascular system.

Knox collected 25 cases of ureteral compression from fibromyomata uteri and concludes from his studies that some compression is caused by large tumors in a large percentage of cases. Giles in a study of 150 cases of fibromyomata uteri observed symptoms of pressure upon the bladder or ureter in 25 per cent of the cases. The symptoms varied from frequent micturition to complete retention.

In this series dilated ureters and hydronephrosis were noted five times. Any other cases, of which no doubt many were present, were either not diagnosed or if diagnosed were not recorded.

COMPRESSION OF BOWEL

Large fibromyomata uteri which fill the pelvis produce more or less pressure upon the bowel and may even cause obstruction. In this series chronic obstruction was noted in five cases and acute obstruction in two cases. Partial obstruction with marked constipation, impaired gastro-intestinal function, distention of the bowel with gas, and malnutrition is probably present in many cases.

STERILITY

Women who possess fibromyomata uteri are prone to sterility. Mann, in an examination of 67 cases of fibromyomata uteri, found that 16 patients were unmarried, and 27 were married and sterile, making 43, or 64 per cent of cases, where there had been no pregnancy. Of 51 patients who were married 23, or 45 per cent, had been pregnant.

In a series of 125 cases of fibromyomata uteri reported by Fredericks, 66, or 52.8 per

cent, of the patients had not been pregnant. Of the 59 patients who had borne children there had been no pregnancy for at least ten or twenty years.

Giles, in a study of 150 cases of fibromyomata uteri, found that 60 per cent of the patients had never been pregnant. In 84 per cent of the cases the patients had either not been pregnant at all or had no pregnancy for at least 10 years. Of 94 patients who were married 69, or 65 per cent, had borne children.

It is probably safe to state that from 25 to 30 per cent of married women who possess fibromyomata uteri will not become pregnant.

ASSOCIATE CONDITIONS

The associate conditions in this series of 3,561 cases are as follows:

Conditions arising in the uterus:

Endometritis, senile	3
Endometritis, suppurating	5
Retroversio uteri	46
Procidentia uteri	38
Gestation	30
Total	122

Conditions arising in the ovaries:

Ovarian cyst, unilateral	244
Ovarian cyst, unilateral, intraligamentous	3
Ovarian cyst, bilateral	24
Ovarian cyst, bilateral, suppurating on one side	1
Ovarian cyst, bilateral, intraligamentous	1
Ovarian cyst, suppurating	8
Ovarian cyst with twisted pedicle	5
Ovarian cyst with intracystic hemorrhage	2
Ovarian cyst with intracystic hemorrhage, twisted pedicle	1
Ovarian cyst with hydrosalpinx	1
Dermoid cyst	23
Dermoid cyst, suppurating	4
Dermoid cyst with twisted pedicle	3
Dermoid cyst, bilateral; umbilical hernia	1
Dermoid cyst with multinodular cyst	1
Dermoid cyst with hydrosalpinx	1
Ovarian degeneration, cystic	287
Ovarian calcification	4
Ovarian fibroma	9
Ovarian fibrosarcoma	3
Ovarian carcinoma	10
Ovarian carcinoma, papillary, bilateral	1
Ovarian papilloma, unilateral	1
Ovarian papilloma, bilateral	1
Ovarian sarcoma	1
Ovarian hematoma	23
Ovarian abscess, unilateral	14
Ovarian abscess, bilateral	2
Oophoritis, chronic interstitial, unilateral	3
Oophoritis, chronic interstitial, bilateral	34
Parovarian cyst	23
Total	739

Conditions arising in the uterine ligaments:

Cyst of broad ligament	6
Haematoma of broad ligament	7
Abscess of broad ligament	2
Myoma of uterine ligaments	4
Total	19

Conditions arising in the Fallopian tubes:

Gestation, ectopic	9
Gestation, ectopic; salpingitis and hydrosalpinx	1
Haematosalpinx	31
Hydrosalpinx, unilateral	127
Hydrosalpinx, bilateral	19
Hydrosalpinx and tubo-ovarian abscess	1
Pyosalpinx, unilateral	73
Pyosalpinx, bilateral	46
Pyosalpinx with ovarian abscess	9
Pyosalpinx twisted upon itself	1
Pyosalpinx with tubo-ovarian abscess	2
Salpingitis, unilateral	138
Salpingitis, bilateral	48
Salpingitis and hydrosalpinx	3
Salpingitis and pyosalpinx	7
Salpingitis and tubo-ovarian abscess	3
Fibroma of Fallopian tube	2
Papilloma of Fallopian tube	1
Papilloma of appendages	1
Tubo-ovarian cyst	1
Tubo-ovarian abscess	5
Total	528

Conditions arising in the pelvis outside of the tumor, uterus, and appendages:

Carcinoma of the sigmoid	2
Recto-vaginal fistula	1
Thrombosis of veins of lower extremity	2
Varicose veins of the pelvis	9
Total	14

Conditions arising outside of the pelvis:

Appendicitis	69
Bartholinitis, chronic	4
Carcinoma of umbilicus	1
Cardiac degeneration	32
Extreme anæmia from hemorrhage	41
Hernia	7
Hernia, ventral	1
Hernia, umbilical	22
Hernia, inguinal	11
Hernia, crural	6
Laceration of the perineum, complete	1
Phthisis, pulmonalis	2
Cyst, vaginal	1
Peritonitis, tuberculous	7
Total	202

The associate conditions will not be considered in detail as they are independent lesions, and are not known to be etiological factors of fibromyomata uteri, nor are they themselves, except in a few cases, caused by the tumors; and no doubt in many instances where fibroid tumors have been removed the operation was primarily undertaken for an associate condition and the presence of the tumor not recognized until the time of the operation.

CHANGES IN CLASSIFICATION

In editing the reports, in order to simplify matters, the following changes were made:

Suppuration, necrosis in the centre of the tumor, and necrobiosis, are classified with cases of necrosis.

Epitheliomatous infiltration of a fibroid tumor arising from adenocarcinoma of the corpus uteri by metaplasia; and fibromyoma associated with carcinoma corporis uteri with epithelial degeneration, are classified with carcinoma corporis uteri.

Sarcoma of the fundus uteri is classified with sarcoma.

Malignant adenocystoma of the ovary is classified with carcinoma of the ovary. Ovarian cysts, large, are classified with ovarian cysts. Dermoid cyst, suppurating, with sinus through abdominal wall, is classified with dermoid cyst, suppurating. Abscess of the ovary is classified with ovarian abscess, unilateral. Cases of salpingo-ovaritis are classified as salpingitis. Chronic oophoritis is classified with oophoritis, chronic interstitial, bilateral.

All cases of ovarian cysts, pyosalpinx, hydrosalpinx, and salpingitis, in which mention was not made whether the condition was unilateral or bilateral, are classified as unilateral.[1]

Pregnancy, with dead foetus is classified as gestation. Procidentia of the uterus and vagina is classified with procidentia uteri.

Adhesions to serous surfaces, serous adhesions to soft parts, extensive intestinal adhesions, and adhesions, are classified with adhesions to viscera. Cases of general pelvic adhesions are classified as chronic pelvic peritonitis.

OPERATION

In regard to the choice of operation there is no doubt that myomectomy is the ideal operation. Unfortunately the operation is applicable in only a small percentage of cases — to easily accessible submucous tumors, and subserous tumors limited to two or three nodules, in young childless women, where complete eradication can be done. While myomectomy is the ideal operation for subserous tumors, it is, nevertheless, followed by a mortality of about 5 per cent. In the same class of cases there would be practically no mortality after a supravaginal hysterectomy. The mortality alone does not represent the seriousness of the operation as the morbidity is marked.

In cases of malignant degeneration of the tumor, or associate malignant disease of the uterus, a panhysterectomy should be performed.

A supravaginal hysterectomy is the operation of choice in all cases where a myomectomy is not indicated and in cases where a panhysterectomy is not demanded. A supravaginal hysterectomy is a more simple operation, requires less time for its performance, and is followed by a lower mortality than is the complete operation. The statement is frequently made that, in supravaginal hysterectomy the cervical stump may develop malignancy at a later date, and that the complete operation should be performed in all cases. Malignancy does develop in the cervical stump in a few cases after supravaginal hysterectomy, probably in less than 1 per cent of the cases. Jacobs had malignancy develop in the cervical stump three times in 466 cases of supravaginal hysterectomy. The criticism in favor of the complete operation is more than counterbalanced by a 3 per cent or 4 per cent lower mortality after the supravaginal operation.

Haultain collected a series of 1,781 cases of supravaginal hysterectomy, performed by good operators, in which the mortality was 5 per cent. He compared this with a series of 1,668 cases of panhysterectomy, performed by good operators, in which the mortality was 8.27 per cent, which shows conclusively that the mortality after the supravaginal hysterectomy is much less than after the complete operation.

The mortality following operations for fibromyomata uteri has steadily diminished as the refinement in technique has advanced. The mortality from recent reports is as follows:

		Deaths
Webster	210 operations with	5
Deaver	105 supravaginal hysterectomies with	3
Baldy	105 operations with	3
Haultain	203 supravaginal hysterectomies with	2
Noble	100 abdominal hysterectomies with	1
Werder	118 operations with	1
Jacobs	427 total and subtotal hysterectomies with	6
	1,268	21

A total of 1,268 operations with 21 deaths, a mortality of 1.6 per cent.

It is the custom, at the present time, of most surgeons when performing a hysterectomy to leave one or both ovaries, in the hope that the symptoms of the artificial menopause will be ameliorated. The benefit of this procedure is a disputed question which time only can settle.

MENOPAUSE

Until recent years it was the opinion of all members of the profession that uterine fibromyomata atrophied and disappeared, and that the patient made a spontaneous recovery after the menopause. Even at this time that same opinion is held by many members of the profession. That such a teaching is erroneous is evident from a study of these statistics. In a series of 506 cases degeneration was found 114 times, and in over 64.9 per cent of the 114 cases, the degeneration took place after the age of forty years, at or after the time of the menopause. In 3 cases, classified as carcinoma of the fundus uteri, all took place after the age of fifty years. Bland-Sutton claims that the dangers of fibromyomata uteri are increased after the menopause. He states, "There is nothing more ironical than a woman spending twenty or even thirty years of her life as a chronic invalid on account of a uterine fibroid, in the expectation that at the menopause she will be restored to health and begin a new life, and then to realize that far from this dream being fulfilled the fibroid becomes necrotic, extruded, and septic, and places her life in the greatest peril and that she may die in spite of surgical intervention."

CONCLUSIONS

1. That a large percentage of fibromyomata uteri undergo some form of degeneration, but that the majority, 64.9 per cent, of degenerations take place in women who are forty or more than forty years of age, or in other words, after the menopause.

2. That fibromyomata uteri and visceral degenerations are found associated in a large number of cases.

3. That young women who are anxious for maternity and possess small tumors which are causing no symptoms, need not be subjected to operation, but should be instructed to report for examination as soon as symptoms develop.

4. That all fibromyomata uteri which produce symptoms, regardless of the age of the patient, and all fibromyomata uteri in women forty or more than forty years of age, should be removed when diagnosed, because the mortality following operation, below 5 per cent, is less than the risk of carrying the tumor, as from 12 to 14 per cent of these patients would die if not subjected to operation.

5. That a supravaginal hysterectomy is the operation of election because of the ease and rapidity of its execution, and last, but not least, because it is followed by the lowest mortality and should be performed in all cases where a myomectomy is not indicated and where a panhysterectomy is not demanded.

6. That many of the associate conditions would cause death if the patients were not subjected to operation, but the mortality in these cases should not be added to the estimated mortality of fibromyomata uteri as they are independent lesions, and are in no way connected with the tumor except that the conditions coexist.

7. That a thorough pathological study should be made of all fibromyomata uteri which are removed, because of the malignant changes and the degenerations which take place in these tumors.

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ACQUIRED ATRESIA OF THE COMMON DUCT DUE TO GALL-STONES[1]

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BY acquired atresia of the common duct is meant the condition which has developed in the individual after the functions of the liver have become adapted to extra-uterine requirements and been normal to all intents and purposes beyond the period for the onset of icterus neonatorum. It excludes congenital anomalies of development in the bile passages and the class of cases presenting at, or soon after birth, cirrhosis, cholangitis, and obliteration of the bile passages, more particularly the common duct. Of congenital obliteration of the bile passage due, presumably, to the action of a maternal toxic agent on the fœtal liver and bile passages, there are more than sixty cases recorded. Almost all are associated with cirrhosis. The cholangitis seems to be a descending process affecting eventually the extra hepatic bile passages and leading to their obliteration. That some cases of cirrhosis go to a fatal termination before the obliteration process has been started, or completed, seems established. Likewise, that in some the obliterative process is delayed or extremely slow in action seems true. In this connection Treves' case is difficult to classify, in that jaundice did not set in until two years of age. He operated the patient successfully by cholecystenterostomy at nineteen years of age for obliteration and absence of the lower end of the bile duct. On the other hand, as will appear in connection with other and more clearly defined cases of acquired atresia, the obliterative process may have been due to irritation of a gall-stone passed subsequently to the onset of jaundice and before operation.

Before the operative treatment of cholelithiasis became generally practiced and the

[1] Read before the Western Surgical and Gynecological Association at its Seventeenth Annual Meeting at St. Louis, Mo., Dec. 30 and 31, 1907.

large series of operated cases were collected, pathologists — Orth, Ziegler, and others — mentioned the condition of acquired atresia of the bile passages but, usually, scantily and with reference to its rarity. Surgical records bear out this view. Kehr (1) had operated on more than 400 cases of gall-stones before encountering an instance of complete obliteration of the choledochus. In his case there was complete obliteration of the common duct at the mouth of the cystic, caused by a stone and ulcer. The duodenal part of the common duct was converted into a pus-containing cyst. No bile was found in the hepatic duct above the stricture, due to long existing stasis and its consequent disturbance of the liver cells. Resection of the stricture of the common duct with drainage of the hepatic accomplished a cure. Robson (2) does not mention an instance of his own occurring in 539 operations, but refers to the case of Treves (3) mentioned above. Moynihan (4) mentions the possibility of the condition but refers to no personal experience with it. A somewhat careful but incomplete review of the literature has yielded other cases so few in number that a brief account of each may be of interest. In this connection the writer wishes to acknowledge indebtedness to Rolleston in his "Diseases of the Liver, Gall-Bladder and Bile Ducts" for several of the cases reported below and other matter in connection with the subject. Ashley's (5) case was that of a girl, 7 years of age, who had been jaundiced for two years and a half. The common duct was obliterated near the duodenum, but the proximal part, together with the cystic duct, formed an enormous cyst containing 16 pints of bile-stained mucus. In a period of three months she was tapped ten times and on each occasion 8 to 10 pints were removed. Post mortem, the cyst was found to consist of the cystic and common ducts, between the latter of which and the duodenum no communication was found.

Oxley's (6) case showed an obliteration of the duodenal termination of the common duct with the rest of the common duct dilated so as to form a cyst the size of a cocoanut. Rolleston (7) mentions a child of 9 years in whom syphilis was suspected but not proved. Here the cystic and hepatic ducts were dilated, and the common duct to the size of a fist. The gall-bladder was atrophied and collapsed. The opening of common duct into the duodenum could not be found. St. Bartholomew's Hospital Reports (vol. xxx, Surgical Registrar's Reports, p. 216) contain the history of a case illustrating cicatrization of an ulcer due to gall-stone. "A woman forty-six years of age was operated for recurrent attacks of biliary colic. The gall-bladder was empty and contracted, but the cystic duct was dilated by five calculi; which were removed. The cystic duct was united to the abdominal wound and bile discharged for ten days. The patient then got worse and died suddenly. At the autopsy the common bile duct was dilated and contained several calculi; its opening into the duodenum was completely obliterated by cicatrization of an ulcer."

Pye-Smith (8) records a case of stenosis of the common duct due to the stone-ulcer-cicatrix sequence. St. Thomas Hospital Reports (vol. xxx, p. 169) contain an example of a tight stricture of the common duct with a soft calculus just above it in a woman 26 years old. Simple stricture was found in a case reported by Holmes (9) and Moxon (10) at the beginning of the common hepatic duct, which, except for bilirubin calcium stones, would not be subject to gall-stone irritation. In a case reported by Moxon and Phillips' (11) cases there was no history of gall-stones. Rolleston (12) describes the only case of simple stricture of the common bile duct which has been detected at St. George's Hospital in the last 15 years. "A man aged 60 years, with chronic jaundice, was admitted with pneumonia which proved fatal. There was a fibrous stricture of the common bile duct in its lower fourth and great distention of the gall-bladder and bile ducts. There was no evidence of any malignant disease or of gall-stones." Krokiewricz (13) reported the case of a woman 57 years of age, in whom the lower end of common bile duct was much stenosed, as if from the stone-ulcer-cicatrix sequence, but upon microscopic examination the process was found to be carcinomatous. Cordier (14) reports the case of a man of 55 years of age with gall-stone history, established by the passage of a stone in stool and persistent

jaundice, in whom at operation a gall-bladder containing 4 pints of bile and mucus, but no stone, was found. There was a complete stricture of the common duct just behind the duodenum. Anastomosis between gall-bladder and jejunum resulted favorably. Another case (15) of the same writer is that of a man aged 21 years who began at 3 years to have colic and jaundice. The stools at time of operation were, however, slightly bile-stained. At operation an impermeable stricture of the lower end of the common duct was found. As in the previous case no stones were found, and an anastomosis between enlarged gall-bladder and jejunum gave a successful issue. The presence of bile in the stools, even though in small amount, shows that the process of cicatrization was not complete, hence strictly the case should not be included as one of atresia. The same writer (16) reported a case of obliterated common duct following trauma over the liver and without the presence of stone in a man of 55 years. Cholecystjejunostomy resulted favorably. The writer's case is as follows:

When seen July 10, 1904, J. B. C., female, married, age 66 years, nativity Mass., residence Dubuque, Iowa, gave this history in connection with her illness which has existed 2 years, 9 months.

Family history was negative. Previous history negative, except for severe headaches and occasional palpitation.

Present illness began Oct., 1901,— 2 years and 9 months ago — with sudden and severe pain in the abdomen in the region of the ninth and tenth ribs, vomiting, purging, chill, and fever. The attack lasted one to two days and subsequent prostration delayed patient's return home from Massachusetts two weeks. Three weeks after return home began to experience excruciating soreness in the same region as before, and extending around ribs to right shoulder blade and shoulder. This condition, with variation in severity, lasted all winter. April, 1903, patient experienced sensation of pushing and grinding, starting in the right side. This extended across back and abdomen and lasted two weeks. With this girdle pain patient was confined to bed and jaundice set in. This has persisted. From a weight of 116 pounds patient gradually lost 36 pounds, but the loss of strength was not as great in proportion as the loss in weight. With the jaundice there was loss of appetite, itching, dullness of the sensorium, many slight chills and, once, a severe attack with high fever. The stools which had been dark became clay-colored. Urine has been scanty and high-colored most of the time since jaundice set in, and patient has had to micturate as often as four times at night. April, 1904, feet began to swell slightly and later the body. The bowels, irregular and costive before, began to be irregular and loose, moving three to four times in 24 hours, and accompanied by pain in lower abdomen.

At present, patient suffers no longer with headaches, gets faint at times, has enjoyed fair appetite until last few days, is not troubled with belching or heartburn, has some shortness of breath, but no cough, occasional palpitation which, however, antedated the illness in question. Weight, 2 weeks ago, 86 pounds. Stools watery and cream-colored.

Examination revealed a short, jaundiced woman with spare body above the waist, and prominent abdomen, and slightly œdematous lower extremities; p. 90; temp. 99.2°; resp. 16; sclera bile tinged; lungs negative; heart apex beat third inter-space inside nipple and no murmurs; liver dullness extends from fifth rib in mammillary line to four fingers' breadth below costal margin; ascites present and prevents examination of other abdominal viscera, but no tumor made out nor tenderness, except near costal margin on a line between ninth rib and umbilicus; circumference of abdomen at umbilicus 86 cm.; urine, high-colored, acid, 1032, bile present, albumin slightest possible trace, sugar none; occasional hyaline cast, some small round epithelial cells probably from kidney, a few abnormal red blood corpuscles, abundance of various forms of large epithelial cells probably from bladder, and pus corpuscles. The next day six quarts ascitic fluid were removed, having a specific gravity of 1011 and a trace of albumin. The abdomen was now soft, and permitted satisfactory palpation. The liver was felt to be hard and smooth for three fingers' breadth below costal margin on the right, and to reach more than half way to the umbilicus, thence across epigastrium transversely, where the edge could be easily grasped between fingers and thumb of same hand. In the epigastrium slightly to the right of the median line below liver margin numerous hard nodular masses slightly tender and movable were made out. The liver itself was not tender, but the region of gall-bladder was still markedly so. Spleen was enlarged. Abdomen otherwise negative.

After carefully considering the hazards of operation in the presence of jaundice, and, more particularly, ascites, patient decided upon operation. Accordingly, through a vertical incision through the right rectus, the abdomen was opened. The residual ascitic fluid was removed. Viscera were found congested and in addition in upper right quadrant densely adherent. So far hemorrhage was not extraordinary, but upon separating adhesions the fresh surfaces bled freely and continuously in spite of ligatures and the fact that no demonstrable vessels were severed. A hard cirrhotic liver and several enlarged lymphatic glands were readily found, and a small contracted gall-bladder identified. From this stage on further

exploration had to be done almost entirely by palpation on account of hemorrhage. A movable stone, the size of an olive, was felt in the common duct, but no evidence of malignant growth was made out. By this time, the hemorrhage had become alarming, and so obscured the field that the attempt to incise the common duct to allow for bile drainage at least, or, in fact, to proceed further, had to be abandoned. The field was packed, and the abdominal wound partly closed. Patient left the table showing signs of shock and hemorrhage, and died fourteen hours later from complete exsanguination in spite of calcium chloride, etc.

Shortly after death a partial autopsy was performed. At this the abdominal cavity was found entirely free from clots, although the pelvis contained free blood. The findings at operation were confirmed. The gall-bladder was contracted to the size of an olive. The common and hepatic ducts were greatly enlarged. At the junction of cystic and common ducts was found a cicatricial contraction. In bladder and ducts were several small flat concretions. Upon removal of the large stone from the lower end of the common duct the condition of atresia of this duct was discovered. The lower end of the duct was perfectly smooth without a sign of opening into the duodenum and might be likened to the blind finger-end of a rubber glove. The bile tract, a portion of the liver, the duodenum, and pancreas were removed *en masse* and examined macroscopically, and microscopically. Macroscopically the liver presented the appearance of hypertrophic cirrhosis, but under the microscope the changes of atrophic cirrhosis were present. Macroscopic examination showed atresia of both common duct and that of Wirsung. The duct of Santorini could not be found, and there was entire absence of the papilla on the duodenal side. Microscopically, the ductus choledochus, that of Wirsung, the pancreas, and duodenum showed chronic inflammatory changes but no malignant elements. Bile was present in the common duct. The stone was found to be a mulberry calculus composed almost entirely of cholesterin, with the poles made up, superficially at least, of bile pigment and calcareous salts.

The cases cited serve to show the comparative infrequency of this condition, as well as the wide range of complications which may be encountered, except cirrhosis, which occurred in the writer's case. Atresia due to carcinoma of the papilla of Vater and head of the pancreas is to be expected, likewise, atresia due to extra dural pressure from any cause, i. e., tumors,— inflammatory or neoplastic, — and rarely adhesions.

By common consent the etiology of the condition is regarded to be infection usually associated with gall-stones, although the stone has not always been found. In such cases the stone is presumed to have been present and started the ulcerative process and been passed before the stricture became complete. Some have likened the process to that of obliterative appendicitis and urethral stricture. The pathological interpretation of the condition rests upon the formation of an ulcer due to infection alone, or infection plus mechanical damage due to the irritation of a stone, leading to new connective tissue formation and subsequent cicatricial contraction. In some of the cases cirrhosis was present in the liver. In this class of cases some question has arisen in regard to the sequence of events. It has been difficult to establish the priority of the bile passage process in most instances, but in some of the so-called congenital cases this was determined in the affirmative. Further observation, too, seems to prove that congenital anomalies of the bile passages are less often predisposing factors than formerly thought to be the case.

The diagnosis of atresia of the common duct cannot be made exactly before operation. In the presence of long-continued and persistent jaundice and bileless stools with a clear gall-stone history and without demonstrable tumor or gall-bladder, one might suspect the condition on the basis of Courvoisier's law. Among the cases cited, however, there are several with enlarged gall-bladders associated with a history of gall-stones if not actually with the stones. Cirrhosis being an infrequent complication of obstruction of the common duct, in fact, of the acquired cases so called the writer's is the only one I have encountered, although common among the congenital cases so called, would be no aid. These facts taken together with the

absolute infrequency of acquired atresia would make the diagnosis a mere guess.

The procedures for the relief and cure of atresia have already been suggested in connection with the summary of reported cases, i. e., resection and various anastomoses of gall-bladder or ducts to the intestinal tract. It is conceivable in the case of an atresia low down at the papillary orifice Kocher's operation of trans-duodenal choledochotomy might do very well, sewing the mucous membrane of duct and duodenum together on either side of the incision. In the presence of cholemia and, especially, hemorrhage, a primary incision of the common duct for drainage and recovery from the cholemic state with secondary resection or anastomosis would be valuable in desperate cases. In general, atresia being a late stage in the natural history of cholangitis with or without cholelithiasis, Richardson's rule of operating for gall-stones as soon as they begin to offend has the value of prophylaxis in this class of cases.

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HEMATURIA IN PREGNANCY[1]

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THE older literature of medicine contains many references to "idiopathic" or "essential" hematuria. Under this head were classed cases of renal hematuria for which no adequate cause could be assigned. As the kidney became more and more the subject of surgical intervention and critical pathologic study, it was found that, in nearly every instance, although the affected kidney might appear macroscopically normal, there were microscopic changes sufficient to account for the hematuria.

Before accepting the possibility of "hemorrhage from a healthy kidney," a position maintained by Klemperer and others, it must be shown, first, that the hemorrhage is really from the kidney, and second, that there is no possibility of any change, however minute, in the kidney structure.

The first requirement is easy to satisfy, but in order to be able to answer the second in the affirmative it will be seen that every part of the kidney must be subjected to the most searching scrutiny by good pathologists.

Applying these tests to the reported cases there are but two (Schede and Klemperer) that fufill them. In each of these cases the hemorrhage ceased after the removal of the kidney, and a painstaking examination of the removed organ showed no departure from the normal. Even here one cannot escape the suspicion that the underlying lesion was overlooked, as in the case of Nicholich (1), in which nephrectomy was performed for continuous unilateral hematuria of four months standing. To the naked eye the kidney appeared normal, and the examination of a section by a reputable pathologist of Vienna showed noth-

[1] Read at the meeting of the Southern Surgical and Gynecological Association, December 19, 1907.

ing abnormal. Some time later a further examination of several sections was made by Motz and Albarran, who found well-marked lesions of chronic nephritis.

To account for the hematuria in these cases, where no adequate cause appears, two principal theories have been advanced, which may be called, for convenience, the angioneurotic and the chronic nephritis theories.

The first, championed by Klemperer and others, ascribes the bleeding to vasomotor changes, affecting the renal vessels. Advocates of the second theory maintain that in nearly every case of obscure renal hematuria the bleeding is due to the changes in the kidney incident to chronic nephritis. Those holding this view insist that hematuria may be the first sign of chronic nephritis, and that it may antedate by many years the appearance in the urine of albumin and casts.

A study of the more recent literature of this subject shows that the latter theory is steadily gaining ground. It has for its supporters most of the surgeons and the ablest pathologists. Its advocates consider that the nephritis may be diffused or circumscribed, and that, in the latter case, its detection may be extremely difficult.

This is well shown in one of Albarran's cases, where the kidney was exposed and found enlarged and congested. At first nothing abnormal was found, but on a more careful search, a minute grayish nodule was seen at the base of one of the pyramids. This was removed, and found, upon examination, to show the lesions of chronic nephritis.

Rovsing (2) in a critical examination of this subject calls attention to the part played in these cases by movable kidney, and cites four cases of his own to sustain his contention. He calls attention to the fact that in several of the published cases, described as "renal hemophilia," the kidney was misplaced. He ascribes the bleeding to stasis, brought about by tight lacing or twisting of the pedicle.

Cabot (3) also reports an interesting case of severe hematuria, due to movable kidney. This patient was placed in bed with her shoulders lowered and her hips raised. At the end of forty-eight hours there was a marked decrease in amount of blood in the urine and in a short time it disappeared entirely. A few days later the patient was allowed to lie flat for four hours; on the next day blood reappeared in the urine. The original position of the patient was resumed, and she was kept in it for several weeks, after which she was allowed to sit bolstered up in bed for twenty minutes each day. This was immediately followed by the appearance of blood in the urine. The kidney was then exposed and, except for a thickened capsule, appeared normal. It was fixed to the transversalis fascia. This was followed by complete relief from the hematuria and all other symptoms.

Cabot discredits the theory of twisted pedicle as a cause of the congestion, and states that, in his opinion, it is a very rare condition. He believes the cause of the congestion to be a slipping downward of the entire organ, which causes an obstruction of the thin-walled vein, while the thicker and more resistant artery escapes.

The explicable causes of renal hematuria are numerous. Fowler (4) in his able monograph upon which I have drawn freely, and to which I cheerfully acknowledge my indebtedness, divides them into local and constitutional. Among the former are inflammation, embolism and thrombosis, traumatism, retention, abnormalities, parasites, tuberculosis and tumors. Among the latter are infectious diseases, nervous diseases, diseases of the blood, intoxications and poisons, and pregnancy and lactation.

A study of these causes shows that some disturbance of the circulation in the organ is the underlying cause in most of them, and that this disturbance is in the nature of stasis or congestion.

In the case I have to report, the rapidly recurring pregnancies were undoubtedly the cause. It is as follows:

Mrs. L. V. G., white, 31 years of age, came under my care in October, 1906. She was a native and lifelong resident of a malarious section of Virginia. Family history unimportant.

Personal History. Never very strong. Had enlarged cervical glands on left side when a child. Scar remains. Married at twenty. Has had seven children, six living and well, and one dead by accident. Two miscarriages. One year ago spat some blood, but does not know where it came from.

Present illness. First noticed blood in urine four years ago. This came on in February while she was

pregnant, and lasted ten days. Child was born in March. There was no hemorrhage during next pregnancy, but in December, 1905, while pregnant with her last child, the hematuria again appeared and has continued, without intermission, since, the child having been born in March, 1906. The hematuria has been more profuse at times than at others, but has never ceased entirely since December, 1905. No history of renal colic. During past year has suffered from heaviness and stiffness in left side, just under ribs and has been sore to touch in that locality. No malaria. Swelling of feet has existed pretty constantly since first pregnancy. It is worse when she is pregnant, but has never disappeared entirely.

Examination. Frail and anemic woman. Pulse weak and rapid. Lips and mucous membrane blanched. Lungs and heart normal. Marked soreness on palpation over the left kidney, but no enlargement detected.

Urine. S. G. normal. Albumin present (due to blood). Microscopically, abundant red blood cells. No pus. No casts seen after most diligent search.

Cystoscopy by Dr. H. A. Fowler. Bladder normal. Ureters normally situated. Openings normal. From left ureter bloody urine oozes with each contraction of trigone on that side. The jet is not thrown out with the usual force but oozes down over trigone. Fluid from right kidney normal. Catheter in right ureter passes two-thirds of the way to the kidney.

As this patient had been under the care of reputable physicians, who had exhausted all medical means for her relief, and as the continued loss of blood was evidently telling on her, a nephrectomy was advised and accepted.

Operation October 30, 1906. Kidney easily exposed and found to be small, with a pale, non-adherent capsule. Two patches of subcapsular hemorrhage. Dense adhesions about upper pole which had to be divided before the kidney could be removed.

Post operative history. Patient made a good recovery. Immediately after her return home she again became pregnant and again blood appeared in the urine. After the birth of the child, which was uneventful, the blood disappeared from the urine and has not reappeared since. She states that she feels well.

Summarizing, we have a history of rapid child bearing, with hematuria appearing during the fifth pregnancy and lasting ten days. It skipped the sixth pregnancy only to appear again during the seventh and never ceasing after that. Another pregnancy immediately followed the removal of the left kidney, accompanied by hematuria, presumably from the remaining kidney, which ceased when the child was born.

Pathologic report. The kidney was sent to the Army Medical Museum. The report of Capt. Russell shows thickening of the capsules of the glomeruli, with unduly prominent endothelium. The tufts are congested and show proliferation, with a few polynuclears present. The capsules contain an albuminous exudate, a few tissue cells, and an occasional red blood cell. In one section there is a small area in the cortex, just beneath the capsule, which shows several glomeruli which have undergone hyaline degeneration and become completely obliterated. At this point the capsule is adherent, dipping down into the cortex by a coarse band of connective tissue. There is marked infiltration of small round cells in this area. The picture here presented is that seen in small granular kidney.

The epithelium of the convoluted tubules shows a general albuminous degeneration. None of the cells shows a regular outline and the nuclei of many of them fail entirely to take the stain. There is very little desquamation. The lumina almost invariably contain detritus which is homogenous in appearance and stains brightly with eosin. In some cases the coagulum distends the tubules so that, practically, we have casts. In a cross section of one of the pyramids it will be noted that there are areas in which there is an interstitial proliferation, accompanied by a congestion of the capsules and the presence of an exudate which in appearance is homogenous.

The most marked changes observed in the sections as a whole are: (1.) Those confined to the glomeruli, which are characteristic of glomerulo-nephritis, and (2.) The peculiar patchy increase in the interstitial connective tissue, seen in the cross-section of the pyramids.

Remarks. There can be little doubt but that the renal changes in this case, leading up to the hematuria, began during the first pregnancy. In this connection, the history of oedema of the feet since then is significant. Owing to the rapidity with which one pregnancy followed another, the kidneys never had time to recover from the strain put upon them, until the conditions present culminated in a chronic congestion which produced the hematuria.

The appearance of the blood in the urine after the nephrectomy may be explained in two ways. It may be assumed that, with only one kidney to take care of the excretory products of pregnancy, and that kidney one that had not time to compensate for the loss of its fellow, the tax on it was too great, and a congestion resulted. Or this appearance of hemorrhage from the second kidney may be accepted as a proof of the statement of Casper, that, although the hematuria may be unilateral, the nephritis of which it is a symptom is always bilateral.

The case also shows the comparatively slight effect of a nephrectomy upon subsequent

pregnancy. It is the second instance in my experience where pregnancy has followed a nephrectomy, and in neither was there any noticeable effect from the removal of the kidney. In this case the pregnancy followed so closely upon the nephrectomy that any untoward results would surely have shown themselves. Baldwin (5) has noticed the same fact, and reports two cases of his own and three from the literature to show that the prognosis of pregnancy after a nephrectomy is by no means unfavorable.

Since it seems to be established that the hematuria of pregnancy is a symptom of chronic nephritis, it is pertinent to inquire as to the cause of the nephritis. The generally accepted opinion is that the renal changes in pregnancy depend upon perverted metabolism and consequent auto-intoxication. The perverted metabolism may be of maternal or fetal origin, or both.

It is only fair to state, however, that certain authorities ascribe a prominent part in the nephritis of pregnancy to dilatation of the ureters from compression. That this compression does exist in pregnancy has been demonstrated by Halbertasma and Leyden, and some authors make Cruveilhier the father of the statement that, during his services at the Maternity Hospital, all women that died during pregnancy or shortly after delivery, had dilated ureters. The condition, however, must be rare as compared with the number of cases showing renal changes. Bouman (6) analyzes seventeen cases of hematuria in pregnancy. The blood in all cases was from the kidney and disappeared after delivery, in several cases reappearing during a subsequent pregnancy. Commenting on the various theories as to the causation of the hematuria in these cases, he dismisses the idea of "essential hematuria" as unscientific and untenable; considers briefly the hemophilic and angioneurotic theories, and concludes that his analysis of seventeen cases shows that chronic nephritis is the underlying factor in nearly every one. In his opinion, there are renal changes in these cases before conception, and pregnancy aggravates these changes through congestion or auto-intoxication.

Gaucher and Sergent (7), in discussing the nephritis of pregnancy, consider that the condition depends upon auto-intoxication, and that it is intensified by each recurring pregnancy, until finally the condition becomes chronic and incurable. The post-mortem examination of kidneys in these cases shows either small and granular kidneys with cysts, or large, white kidneys without cysts or granulations. Histologically, islands of sclerosis are found.

Diagnosis. In the diagnosis of renal hematuria the cystoscope is invaluable. By its aid we can learn from which ureteral orifice the blood is escaping, and also make ourselves certain as to the presence of a second kidney. Supplementing the cystoscope by the ureteral catheter, we can determine that the blood is from the kidney and not from the ureter.

Treatment. The surgical treatment of these cases comprises decapsulation, nephrotomy, and nephrectomy. The single case reported by Young, of the cure of this symptom by the injection of adrenalin solution into the pelvis of the kidney through a ureteral catheter, is not sufficient to form a foundation for any generalization as to its permanent efficiency.

A study of the cases treated by operation shows that the hemorrhage has ceased just as promptly after decapsulation (Freeman), or nephrotomy (Chetwood and others), as after nephrectomy, and one is forced to the conclusion that it would be better to give nephrotomy or decapsulation a trial before resorting to the more severe operation. This would be my own inclination should another simillar case come under my notice. If the hematuria be due to nephritis, it is certainly important to save as much of the kidney tissue as possible, with the view to prolonging the life of the patient.

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TUBERCULOSIS OF THE PATELLA[1]

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CONSIDERING the frequency of primary tuberculosis of the knee joint, it is quite surprising that the patella should so rarely be the seat of the initial focus. This is still more striking when we consider the exposed position of the patella, and the frequency with which it is traumatized in infancy and childhood, the life zones in which bone tuberculosis is most common, and the close relationship which exists between trauma and bone tuberculosis, in other positions of the body. Its immunity is probably explained by the anatomic fact that it has no epiphyseal or capillary loop circulation; in other words, it is a sesamoid bone.

Primary tuberculosis of the patella has been investigated and described by a comparatively small number of surgeons and pathologists. The universal medical literature has but few references to the subject. Among the conspicuous investigators of this affection are Volkman, Gross, Röpke, Kummer, François, Schleuter, Kocher, and Chambon. Putz, of Strasbourg, in 1860, reported several cases of osteitis of the patella, and emphasized the fact that the bone is not indispensable for gait. In 1880, Albert (1) reported a case of osteitis of the patella treated by incomplete resection; the case was followed by death. Ribera Sans (2) speaks of tuberculosis of the patella in children, and its treatment by complete resection. The subject is mentioned in *Olier's Traité des resections*. The first and most systematic work on osteitis of the patella is that of François, who dealt with the subject in a Thesis (Lyons, 1888).

In 1896, Ménard, physician-in-chief of the Marine Hospital, Bercx-sur-Mer, reported, at the 10th Congress of Surgery, held in Paris, 6 cases of primary tuberculosis of the patella.

E. Kummer (3), (Geneva), reports 1 case of his own, of tuberculosis of the patella, 3 from Kocher's clinic, and 3 additional communicated to him by Kaufmann (Zürich).

In 1900, Gross (4), (Geneva), published an article in which he collected 36 cases of primary tuberculosis of the patella, including 4 from his own experience.

In consulting a number of statistics on tuberculosis of the bones and joints, we find that among 1,752 cases collected by Alfer (5), the tuberculous process involved the knee in 281 cases, while the patella was involved in only two. Koenig found the patella involved in 33 out of 281 cases of joint tuberculosis, with primary osseous foci. W. Röpke, in a long and valuable article (6), reported only 8 cases from all the clinical material at the Jena clinic, from 1889 to 1904. Schlüter, analyzing 69 cases of tuberculosis of the knee joint, found both tibia and fibula involved in 21; the femur alone in 13; the tibia alone in 27; while the patella alone was involved in only 5 cases; in association with tuberculous foci elsewhere, the patella was involved in 13 cases; in the remaining 3 cases, there was synovial tuberculosis.

Consulting Cornet (Berlin) on the subject of bone tuberculosis, we find that the expression, "Primary tuberculosis" of bone is only a relative one, inasmuch as even the primary foci are always secondary to a focus elsewhere. In other words, it is a metastatic process, the infection traveling either by the blood or, rarely, by the lymphatics. The vascular metastasis is denied by some, for if this were the route through which infection traveled, the latter would have to be general. This assumption is erroneous. Bone tuberculosis is rarely transmitted from a near-by tuberculous process. In a case of Ruge, the bone tuberculosis was supposed to originate from the near-by pharyngeal tonsil. This was not demonstrated, however. Many cases of tuberculosis of the mastoid process originate from tuberculosis of the middle ear. This is neither blood nor lymphatic transmission; it is involvement by continuity or contiguity of process.

[1] Read before the Chicago Surgical Society, December, 1907.

We see, therefore, that the term "primary" is relative, and that there must always be, somewhere in the body, a tuberculous focus, which is the original atrium of infection. The tuberculous focus, in the bone, can, in turn, give tuberculous metastasis in other bones or distant organs. Experimentally, tuberculosis of the bone was produced by injecting tuberculous sputum or pus, into the blood stream, and then traumatising the bone, but it did not occur without the trauma. Such experiments were made by Schüller, Krause and Müller. That tuberculosis of the bone is secondary, is beautifully illustrated by the report of 67 post-mortems, by Koenig-Orth, who found that in 53 cases of tuberculosis of bones and joints, there was tuberculosis elsewhere, the lungs were the primary focus in 37 cases, the lymph-nodes, and particularly the bronchial ones, were involved in 21 cases; the genito-urinary apparatus was involved in 9. The mediastinal and mesenteric lymphatic glands, which filter the lymph from the lungs and intestinal tract, are commonly the seat of the primary tuberculous involvement; occasionally the lesion is so minute that it is very easily overlooked. Scrofulous patients are prone to tuberculosis of the bone. Albrecht collected 325 cases of fungous inflammations of the joints, and in one-third he was able to trace the infection to scrofula. Ruprecht, Sprengel and others, call attention to the relationship of tuberculosis of the bone and joints to the scrofulous condition of the skin and organs of special sense. It is a well-known fact that the age in which bone tuberculosis is most common coincides with that in which the lymph-nodes are more frequently tuberculous. It is very true, on the other hand, that tuberculosis of the bone may occur in *apparently* perfectly healthy individuals. The infection may take place through the skin, as in cases of injury the cutaneous lesion may be insignificant, even only an acne papule; heals very rapidly, leaving no evidence of the atrium of invasion of tuberculous infection, and yet cause tuberculosis of the bone or joint. In some cases of primary patellar tuberculosis, the initial focus could not be detected at autopsy. Among 67 cases, for example, Orth was able to find the original infection in 14 instances only. Pansini, Sprengel, and Kossel have repeatedly shown that lymph-nodes may be absolutely normal in appearance, particularly in children, and yet be the seat of small tuberculous foci. Cornet found latent foci in 4 children, out of 10, who died of diphtheria. Such lymph-nodes become caseous, and after perforating their capsule, or, being taken up by the efferent lymphatics, may spread through the lymph channels or blood stream, and be arrested at the hilum of the lung, giving the typical tuberculous adenitis of children, or may be arrested in the epiphyseal ends of bones, or in the joints, giving tuberculous osteitis or arthritis. Infectious diseases, particularly measles, scarlet fever, and pertussis, tend to the liberation of encapsulated tubercle bacilli, and frequently result in metastatic tuberculosis. Since the lymph-nodes enlarge during these diseases, by increasing their hydrostatic pressure, bursting of the glands is favored. This is probably the reason why tuberculosis of the bone is rather common after the exanthemata. So frequent is this occurrence, that it is even recognized by the laity that measles and scarlet fever commonly have bone and joint sequelæ. Another potent factor in the production of bone tuberculosis, is trauma. The latter, however, cannot produce tuberculosis unless the tubercle bacilli are already present in the blood or lymph streams. Nathan Raw (7) is of the opinion that tuberculous infection of bones and joints is produced by the bovine bacillus. The consensus of opinion is that injury to the tissues diminishes their resistance to infection; and when the tubercle bacilli escape by the injury from the lymph or blood stream, into a center of traumatic lesser resistence, favorable conditions for their development are present.

With particular reference to tuberculosis of the patella, it can be said that the primary focus generally develops during the period of most active growth of sesamoid bone, which is early adult life, and later than the more common epiphyseal tuberculous involvements. In the process of ossification, the vascularity is increased; there is a physiologic slowing of the blood stream, as there is a varicosity of the capillary loops near the line of ossification. This condition is supposed, by some pathologists, to mechanically favor the deposition

of bacteria in the tissues. The infection is not dependent upon the number of bacilli, but very much more upon the degree of their virulence, or the absence of opsonins or individual resistance. Lexer has shown that non-virulent bacteria are easily destroyed in the tissues. Frederich, in his experiments, shows that with injections of non-virulent bacilli into the arteries of the kidneys, he was unable to produce renal tuberculosis.

A tuberculous focus of the patella may open either externally, into the pre-patellar bursa, and from there rupture through the skin, or it may open into the joint, and cause the most serious complication of tuberculosis of the patella. The latter occurred in 12 out of 15 cases collected by Chambon, Ollier, François and Guillemain. Occasionally, a small sequestrum may be eliminated externally, and a repair of the tuberculous process take place. In most of the cases, however, the tuberculous process invades the knee joint. There is an anatomic reason for this occurrence, as in adults the posterior surface of the patella is separated from the knee joint by only a thin layer of cartilage, which becomes thinner as age advances, and offers but little resistance against penetration. According to Röpke, the penetration of the cartilage is facilitated by the existing arthritis, which is the result or influence of the proximity of the pathologic process to the synovial membrane. If the process is nearer to the anterior surface, the pre-patellar bursa becomes infected, and afterwards the infectious product finds its way, either through the skin in front of the patella, or travels downward, and opens on either or both sides of the upper extremity of the tibia; rarely, however, it opens to the sides or the upper portion of the patella.

Ossification of the patella begins in the fourth year, its center is in the pre-patellar tendinous tissues, and spreads in this tissue in all directions until finally it supplants the tendon completely; it is separated from the knee-joint by a thin layer of cartilage, which persists through life. There remain attached to it, below, the ligamentum patellae, and above, the quadriceps tendon. The ossification is complete between fifteenth and sixteenth year.

Age of Incidence. The age of incidence varies greatly. All the cases reported by Röpke, were between the ages of two and eight, while in the 36 collected by Gross, in which the age was known in 33, 13 individuals were under 20, while the remaining number were over that age. Billroth's analysis shows that one-third of all cases of bone tuberculosis occurred within the first ten years of life.

The symptomatology of tuberculosis of the patella can be described as it occurs in the (a) extra-articular and (b) intra-articular stages. The symptoms of the disease as classified by Forget, are: (*a*) period of pain, (*b*) period of abscess formation, (*c*) period of fistulous tract.

In the extra-articular period we may have all three stages as described by Forget.

The pain is continuous, day and night, moderately severe, and is the earliest symptom. The exposed position of the bone permits direct pressure upon the diseased focus, causing great sensitiveness. In addition to the pain, palpation may reveal irregularities on the surface of the patella. The most marked physical sign is the enlargement of the patella, both in circumference and depth. So striking this that it suggests a sarcoma rather than tuberculosis.

After a period of pain, not exceeding two or three months, an abscess may form, similar to the cold abscess in Pott's disease. It usually opens anteriorly.

The fistulous tracts, leading to the tuberculous cavity, may be one or several.

In the early stages, previous to the joint involvement, there is perfect freedom of motion, yet the patient is subconsciously cautious, and holds the knee in extension. *Hydrops genu* is an early symptom. In the more advanced cases, where the tuberculosis has extended to the joint, the capsule is thickened; there is limitation of motion and pain, and apparent articular enlargement, due to the atrophy above and below the joint, and not to bony thickening, as comparative measurements show that the diseased joint is not enlarged. The best and only reliable measure is the shoemaker's measuring rule.

Diagnosis of primary tuberculosis of the patella is rather difficult. While the focus is

small, circumscribed, and the knee joint perfectly free, the clinician seldom thinks of the possibility of a primary tuberculosis. The X-ray, at this stage, may be valueless, inasmuch as, with a small cavity, the contour and shadow of the patella may be normal, and not indicate trouble in the bone. Later, however, it gives a classic picture and greatly aids in the differential diagnosis, as is so beautifully shown in the accompanying skiagrams of our cases. Gross says that "if one bears in mind the possibility of tuberculosis of the patella, many knees will be saved." There is no doubt in the author's mind that a great many cases of joint tuberculosis have been due to primary tuberculosis of the patella. We therefore wish to emphasize the importance of an early and correct diagnosis.

One of the means of diagnosis is the use of tuberculin, which is condemned by Krausse, in his classical monograph on "Diseases of the Bones and Joints." The tuberculin of Dr. Trudeau is extensively used in Halstead's clinic in the Johns Hopkins Hospital, and according to Bloodgood (8), there have been no ill results from its use.

In our clinic we make use of 1/10 c.c. of old tuberculin in 10 c.c. of a .5 per cent carbolic water, as the working solution; 7½ minims of this solution equals 5 mg. tuberculin, which is the dose for diagnostic purposes. This produces an elevation of temperature from 101° to 103° within 30 hours after injection, which all subsides by 60 hours.

We have found a simpler, more effective, and less disagreeable means in what is known as the ocular tuberculin reaction. One drop of a 1 per cent solution of the old Koch tuberculin is placed in the left eye; a conjunctivitis results within 24 hours in all cases in which there is active tuberculosis, and persists for 48 hours. If there is no active tuberculosis, the conjunctiva will remain perfectly normal. Care must be taken not to make a second test within 10 days after the first, as the previous instillation sensitizes the eye so that a reaction will occur in normal individuals. There is rarely fever, malaise, or inconvenience in tuberculous cases, and there is no lasting disturbance to the eye.

In the differential diagnosis, we must exclude cold pre-patellar abscess, which is more fixed than a pre-patellar bursal infection or effusion. Aspiration confirms the diagnosis. Primary tuberculosis of the pre-patellar bursa is extremely rare, and all bursal tuberculosis should be considered as originating from the patella.

In the case of fistulous tracts, the integument corresponding to the fistulous opening may be covered with erythematous patches, resembling the cutaneous lesion of lupus. The absence of apple-jelly nodules in the skin, and the history of pain on pressure upon the patella, prior to the appearance of the fistulous tract, will rule out lupus.

Chronic pre-patellar bursitis, with infection, and often with sinus formation, must be differentiated from a true tuberculosis of the patella.

Treatment. If the cavity is small, the sequestrum can be removed, the cavity carefully curetted and afterwards filled with the Moorhof, or, better, with our glycero-gelatine-formalin plug. The latter is made by boiling 100 c.c. of white gelatin in 150 c.c. of glycerine and 500 c.c. of water. One to two per cent of commercial formalin is then added. It may be poured into the cavity in liquid form — it quickly solidifies, or it may be inserted as a semi-solid mass. It is powerfully antiseptic, absorbable, and non-necrotizing. It greatly stimulates tissue regeneration. In the more advanced cases, however, not involving the entire patella, one should be careful in preserving the intervening cartilage between the patella and the joint, as otherwise there is great danger of infecting the knee joint.

In a case of Held, quoted by Putz, of Strasbourg (1860), the intervening cartilage was destroyed; yet the joint was not opened during the operation, because it was previously sealed and separated from the patella by a heavy plastic exudate which protected the joint during the operation. In such cases, the patella can be removed *in toto* without danger to the knee joint.

In another group of cases, to which ours belong, the patella should be extirpated *in toto*. François and Ménard used the semilunar incision of Mackenzie, which consists of an incision with the concavity upward, running from condyle to condyle. The patella was

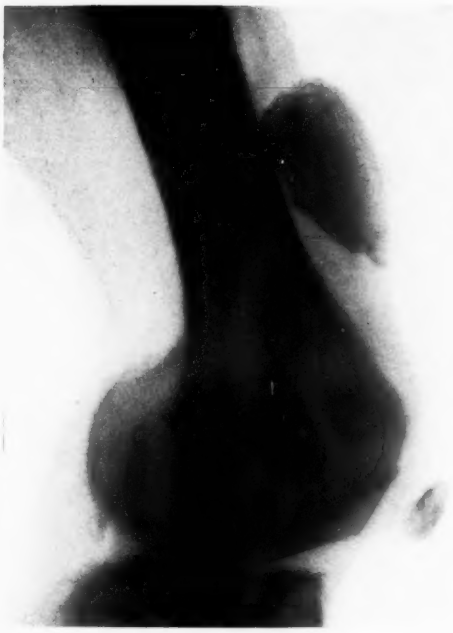


Fig. 0. Shows a fracture of the patella of 23 years standing. Patient walks perfectly. Ligamentous union 3½ inches long.

pushed upward, the knee flexed, which permitted the inspection of the joint. If, however, the knee-joint is involved, the case must be treated on the general plan of tuberculosis of the knee-joint.

The patella is not essential for perfect mobility and function of the knee-joint. The theory that it serves the purpose of facilitating the sliding of the quadriceps tendon on the femur, and also assists the quadriceps in transmitting its action upon the leg, is no longer tenable, according to Joachimasthal (9), and our clinical experience with fractures. Animals using their quadriceps extensively, like the kangaroo, for example, have no patella. There are cases on record of congenital absence of the patella in man with a normally functionating joint.

By employing the sub-aponeurotic removal of the patella, if possible, the bone may be reproduced. François was the first to show that sub-aponeurotic removal of the patella is followed by the formation of a nucleus, either bony or cartilaginous, generally smaller than the original patella, but physiologically its equivalent. The technique of our procedure is as follows:

a. Preliminary preparation of the joint, which consists of producing a chemical inflammation in the joint by injecting 2 to 6 drams of 2 to 5 per cent solution of formalin in glycerin (which is prepared 24 hours before needed), a week or ten days before the operation. We induce this chemical inflammation preparatory to all arthrotomies for patellar fractures, movable cartilages, etc. By the preparatory treatment of the joint, a local immunity is developed, through the infiltration of the tissues, and the occlusion of all the lymph spaces, induced by the chemical inflammatory reaction. Trauma, in the way of dissection or handling in these joints, will not produce a large quantity of effusion, as it does in non-immunized joints. They offer a much greater resistance against infection.

Fig. 1. Line of incision.

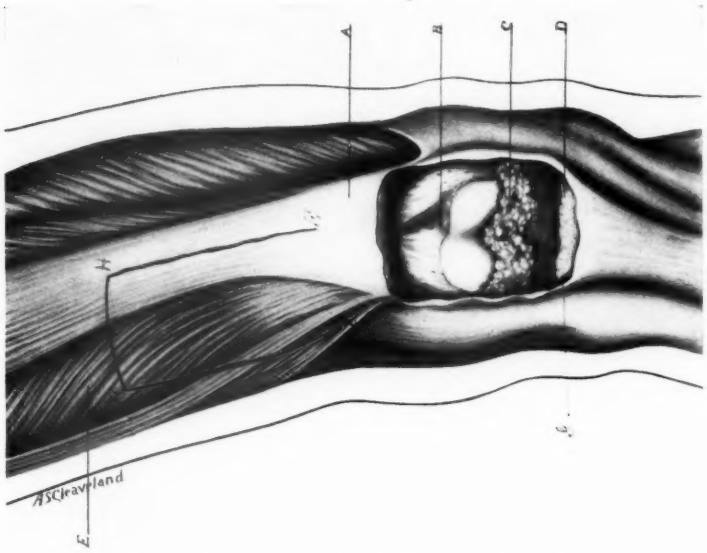


Fig. 2. Anterior view of the joint with the patella excised.

b. Open the knee-joint by a 7-inch incision in the outer side of the patella (from a to c).

c. Make a sub-aponeurotic excision of the patella (from c to d), leaving ends of quadriceps tendon and ligamentum patellæ exposed.

d. Prepare the flap, for the extension of the quadriceps tendon downward, by splitting the quadriceps tendon and vastus externus muscle from point (*h*) to point (*e*), dividing the vastus externus transversely to (*j*), and splitting it back to (*i*); then turn the flap downward, with its fascial side to the joint, and approximate point (*h*) of the flap to (*d*) of ligamentum patellæ, and point (*j*) of flap to (*g*) of liga-

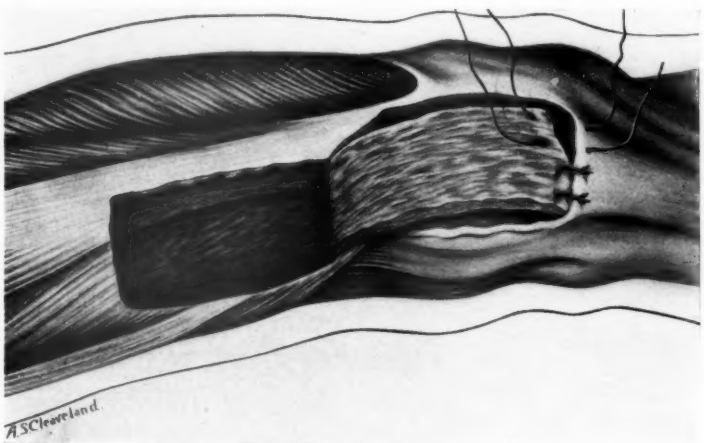


Fig. 3. (Case 1) Extension-flap placed in position.

Fig. 4. (Case 1) Showing line of suture for flap and closure of rent in quadriceps muscle.

mentum patellæ. It may be united end to end, or may overlap the patellar ligament. The fascia and its fat should be turned toward the joint. This flap is used as a substitute for the patella and is an extension of quadriceps tendon. The suture is done with kangaroo tendon, silk or chromicized gut, or it may be accomplished with a figure-of-eight silkworm gut suture, supporting the outer loop with a gauze pad, so that it does not cut into the skin. This is probably the most desirable, as well as the strongest, method of suture.

e. Suture the aponeurosis of patella securely to the divided edge of the deep fascia, and continue until the quadriceps tendon and muscle are entirely embedded. Close the rent left in the vastus externus by buried catgut sutures.

f. Insert a superficial drain from the joint surface to the lower angle of the wound.

g. Dress in a straight posterior splint.

Fig. 5. (Case 1) Showing lateral view of the joint, showing the quadriceps extensor flap.

This was the technic followed in both of our cases, with the results as indicated in the accompanying photographs.

HISTORY. CASE I

June 10, 1904, Patient, C.L.H., Milwaukee, Wis. Occupation, salesman. Age, 37 years. Sex, male. Sick, 5 years.

Family History. Mother living. Father died of paralysis at 56 years. Three sisters, two brothers, all living.

Personal History. Married 2 years; no children. Wife living.

Previous Illnesses. Measles when a child. Slight attacks of rheumatism.

Present Trouble. About 6 years ago, patient, in passing by a counter in his store, struck his right knee cap upon a sharp projecting piece of wood.

Following this the knee began to swell and was very painful; but patient continued at work for about six days after the injury. At this time the knee became very painful and patient was obliged to go to bed; was laid up for two months, and had the leg in a cast. After this the swelling left the knee and patient returned to his work. Knee had resumed its normal size and was not painful.

Fig. 6. (Case 1) Shows conditions of patella, January 22, 1900.

Fig. 7. (Case 1) Showing the honey-combed condition of the tuberculous patella 6 months before operation, January, 1904.

About 3 months later, patient was laid up for 3 weeks with a similar attack, but without preceding trauma. Shortly after this the patient went to Hot Springs and was treated, but knee did not improve; remained painful and swollen. *Pain was most intense in the night.* Since then patient has worked most of the time, but his knee was always painful and weak. About two or three times a year it would swell up and become very painful, incapacitating him for a week or two. Appetite usually good. No gastro-intestinal, nor urinary symptoms. Patient lost no weight.

Physical Examination. Shows a patella 3½ inches in diameter and almost circular, i.e., enlarged in all directions, and elevated apparently an inch above the normal level. It is irregularly nodular on the surface and margins, and very sensitive to continued pressure. There is a moderate degree of effusion in the joint. The skin is not adherent to the patella: it is movable on the femur; voluntary extension is perfect, but flexion could be carried only to a right angle. There was no thickening of the capsule, and none of either the tibia or femur.

Skiagram (Fig. 6) shows condition of patella January 22, 1900, and skiagram (Fig. 7) of January, 1904, shows the advance made by the disease in 4 years.

Skiagram (Fig. 8) shows the normal right patella (January, 1900) for comparison.

HISTORY OF OPERATION.

Preparation. Usual preparation. Rubber acetone solution.

Fig. 8. (Case 1) Showing normal patella in the same patient.

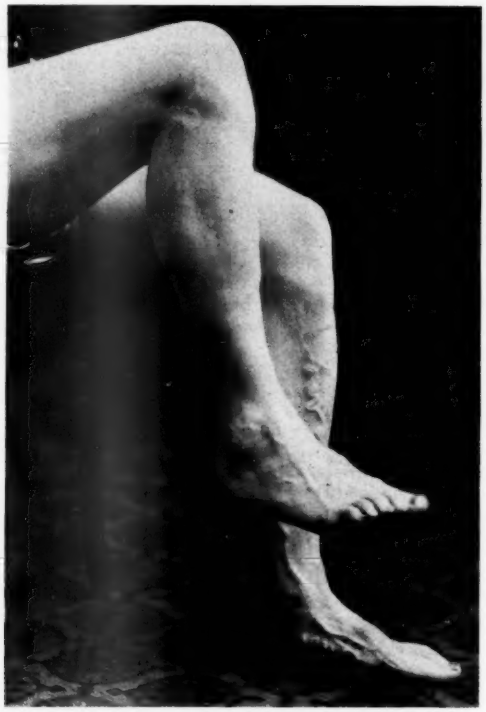


Fig. 9. (Case 1) Shows the honey-combed condition of the patella, 4½ years before operation.

Pathology. Many granulating foci present in patella, tuberculous in origin. Foci have ruptured through the articular surface, producing scars on the articular surface of the cartilage. One sinus had recently ruptured. Patella was riddled with sinuses. Proximity of foci to the articular surface produced recurrences of acute synovitis. (Mentioned in the history). No other tuberculous foci found.

Operation. 1. Lateral incision. Patella dissected out. Synovial membrane opened. 2. Synovial membrane closed with continuous cat-gut sutures. 3. Row of continuous kangaroo tendon sutures between ligamentum patellæ and aponeurosis patellæ and quadriceps extensor flap. Horse-hair in skin. Three-quarters anterior splint.

In a recent letter, the patient states: "I send herewith photographs of my leg. The operation turned out a perfect success and since have been able to use it fully as well as the other; even in going up or down a hill or stairs, it does not inconvenience me in the least."

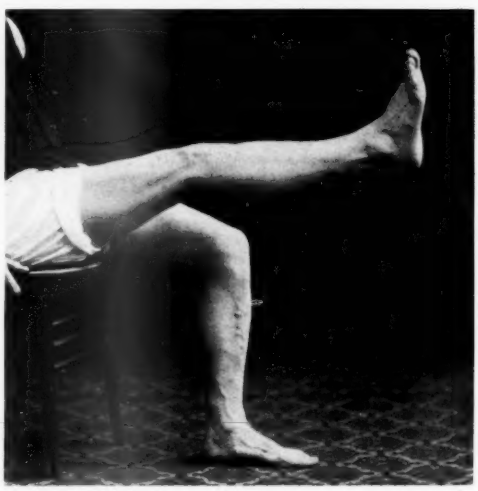


Fig. 10. (Case 1) Showing the degree of voluntary extension 3 years after operation.

HISTORY. CASE II

M.DeR., referred by Dr. F. G. Dyas.

Family History. Negative.

Personal History. Male, aged 27 years; married, 4 years; 2 children, both well and healthy. Born and

Fig. 11. (Case 1) Showing patient standing on the limb 3 years after operation.

always lived in Chicago. Uses 3 to 4 cups of coffee daily. For last 4 years used alcohol in moderation; 4 years previous to this was a hard drinker. Romberg sign absent. Pupils react in both accommodation and light. There is no muscular incoördination. During the past year has at irregular intervals, perhaps to the number of 15 or 20, experienced girdle sensations, describing them "as though some one had a rope around the body and was pulling on both ends."

Past Illness. Measles and typhoid fever during childhood, uneventful recovery; also had skin lesions on anterior surface of both legs during early childhood, scars now present showing location of original trouble. Ten years ago was operated for appendicitis, making a good recovery. Two years ago was operated for hydrocele. During the past three years, at irregular intervals and always following exposure or chilling, has had "rheumatic pains" in muscles of arms and chest.

Present Complaint. Began two years ago with sudden onset; while patient was in bed, convalescing from his hydrocele operation, he experienced sharp, sticking pains in the left patellar region (gives no history of any injury, slight or otherwise, to left knee). These initial pains lasted a few hours and then the character changed to a dull ache, which was constantly present. This was lessened when he threw the weight of his body on his left foot. Says that from the first he noticed a slight swelling of the left knee and the left patella seemed larger than the right one; says that in the next six months the increase of swelling of the knee and the enlargement of the patella were very slow, but progressive.

Six months after the onset of the trouble, while stepping up on a curb-stone his foot slipped and he made a violent effort to regain his equilibrium, which prevented his falling, but at the same time he experienced a sharp, severe pain in the left patella; also a feeling of something giving way there. He was unable to step on his left foot and describes the pain as being excruciating. He was about a block from home and alone at the time. Says that it took him over a quarter of an hour to cover the distance, hopping on one leg and hanging to railings and supporting himself by leaning against the walls of buildings. He fainted when he reached his own door-step. (This was a pathologic fracture of the patella as shown in skiagram, Fig. 12.) The knee swelled and the next day was about three times its original size. The swelling and acute pain gradually subsided, and he was able to bear part of his weight on his left leg in about a week and a half. Since that time he has had a continuous dull pain, and has been unable to extend the leg on the thigh. At irregular intervals, pain was more severe, with more or less swelling, lasting a few days and disappearing after giving the injured part a rest. There has never been any redness of part during these attacks. There has been a steady loss of weight, with a continuous decrease in general strength, in the past two years, the loss in weight being about 30 pounds.

During the past three years has had night sweats nearly every night and says that there has been an evening rise of temperature, but not as often as the sweats. An-

Fig. 12. (Case 2) Showing pathologic fracture at the line of tuberculosis before operation.

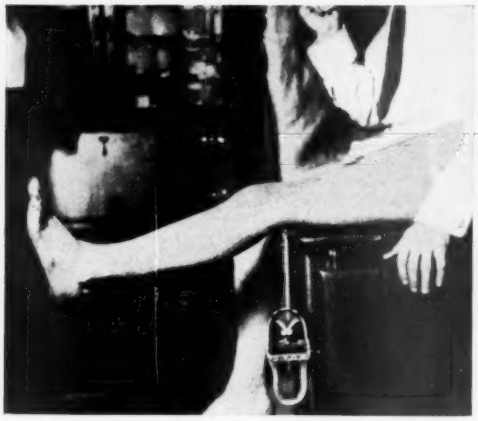


Fig. 13. (Case 2) Showing the degree of voluntary extension 7 weeks after operation.

Fig. 15. (Case 2) Showing the degree of voluntary flexion 7 weeks after operation.

other thing patient mentions is, that after any attempt at exertion (mental or physical), the left knee (anterior surface) is bathed in copious perspiration, which is localized in this area.

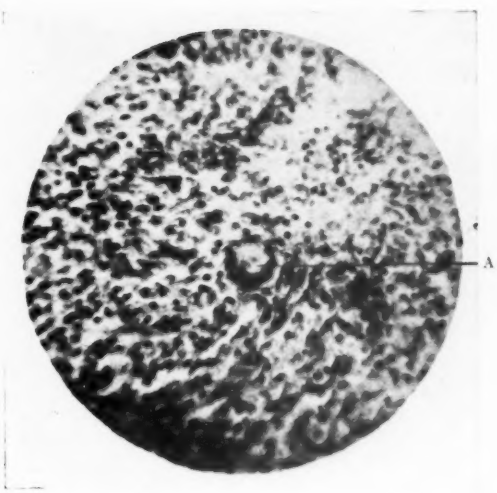
Examination. The patella measures $4\frac{1}{2}$ inches in length and $3\frac{1}{2}$ inches in transverse diameter; it appears to be elevated $\frac{1}{2}$ inch above the normal level. It has a transverse crease across its center, at the line of pathologic fracture; the fragments are slightly movable on each other. The margin is irregular, and there is effusion into the joint.

Ten days ago, left knee was aspirated; about two ounces of serous fluid was removed; the knee was injected with 1 ounce of 2 per cent formalin and glycerine solution. There was considerable increase in the synovial fluid for two days and then absorption rapidly took place.

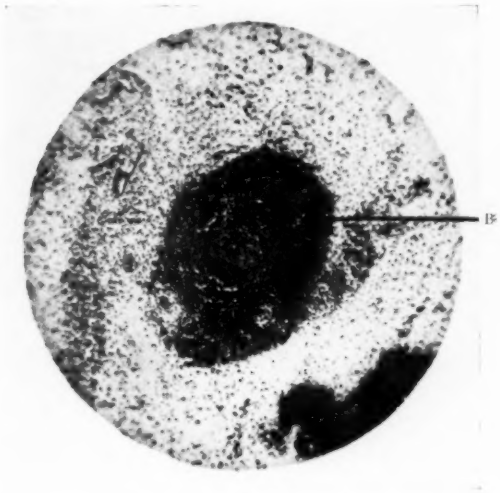
Pathology. Tuberculosis of the patella, with foci

Fig. 14. (Case 2) Showing voluntary extension in the erect position, 7 weeks after operation.

Fig. 16. Case 2. Mr. DeR. A, A, Tubercles — low power.



Case 2. Mr. DeR. A, Giant cell — high power.



Case 2. Mr. DeR. B, Tubercle — low power.

involving both upper and lower fragments. A fracture a little below the middle. The patella was completely excised with its synovial membrane. The synovial membrane throughout was very hyperæmic and infiltrated, the result of the formalin and glycerin injection. No evidence that the tuberculous process had penetrated the synovial membrane into the joint. No foci of tuberculosis in the joint.

Tube inserted. Technic exactly as in case 1.

Admitted September 11, 1907. Operations September 11 and 21, 1907. Dismissed October 26, 1907. Highest pulse and temperatures: 16th day, p. 108, T. 100 26th day, p. 114, T. 100; September 22nd, 6 p.m., p. 112, T. 100-4/5.

(Figs. 13, 14, and 15 show the degree of motion 7 weeks after the operation.)

The patient left the hospital with complete healing, and was able to flex the knee to a right angle. When presented, on December 5th, to the Chicago Surgical Society, he could walk without a limp, so that one could not discern, from his gait, which limb had been affected, and he could extend the leg on the thigh perfectly, and flex it to a full right angle. He had no pain or discomfort, and a cursory examination would not even reveal the absence of his patella.

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PROPHYLACTIC USE OF THE FILIGREE IN INFECTED WOUNDS OF THE ABDOMINAL WALL[1]

(Experimental Part from the Physiological Laboratory of Washington University; Clinical Part from St. Anthony's Hospital.)

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At the Boston meeting of the American Medical Association, I presented a report of twenty-two cases, in which I had made use of an original filigree, for the treatment of post-operative hernia and allied conditions. Five years' experience with the contrivance was crystallized in the following concluding statement in that paper:

"My results, detailed above, have proved, I trust, that the contrivance does not absolutely need to have a clean wound for its bed, and that it will also stand the strain incident to pregnancy, and other rigorous conditions. Not one of my patients died as a result of its use; not a single filigree of the twenty-two gave cause for removal; nor have I a failure to record after its use."

It is not the purpose of *this* paper to discuss further these twenty-two cases, which have been reported fully in three articles, viz., 1. An improved filigree for the repair of large defects in the abdominal wall (*Annals of Surgery*, July, 1903). 2. Additional cases in which the author's silver filigree was used for the radical cure of abdominal hernia (*Interstate Medical Journal*, vol. x, No. 9). 3. Five years experience with an original filigree, intended to prevent and cure abdominal hernia (*Journal of the American Medical Association*, September 8, 1906). I will not go especially into detail concerning the more recent fourteen instances, except those where the filigree was used in a suppurating wound. Of this last named variety, six cases are fully reported below.

At the expiration of six and one-half years, since the method was introduced, I have used it thirty-six times and still have no reason for regret. There has been one recurrence, as will be detailed later, owing to an improper experimental use of the device, and one filigree was removed by mistake. This was in Case 27. A young woman, with a post-operative hernia, was treated by the implantation of a filigree, and at the same time a retro-displaced uterus was attached to the anterior abdominal wall by a silk thread. Infection of the wound occurred, and a sinus, leading down to the thread, persisted several months. In attempting to remove the silk I so distorted and displaced a portion of the filigree that I thought best to remove it. This was partially accomplished, but with the greatest difficulty, although it had not been sutured in place.

Since I commenced this work I have been more and more impressed with the fact that the patients whom I get for these operations have experienced suppuration in the original wound; hence, it is only natural that I should have considered a means of saving them the annoyance of a second hospital experience, to say nothing of the suffering, disability, and danger in the interim.

Just how many suppurating abdominal wounds result in hernia was determined, some years ago, at the then famous Mikulicz Clinic, in Breslau. They studied the laparotomy wounds of years past, and found that just two-thirds of those which had become infected were later the seat of hernia.

From my series of thirty-six filigree cases, six have been selected in which a filigree was implanted in an already infected wound. A brief description of each follows:

Case 15. A boy, 12 years of age, had been operated upon for purulent appendicitis two weeks earlier, and on October 31, 1905, I placed a small filigree beneath the muscle edges of his wide open wound. A fair test of the contrivance, was, however, not made in his case, since his physician, becoming alarmed at other complications, removed the filigree without my knowledge. The boy ultimately recovered.

Case 16. A young man had been drained for appendix trouble by an assistant of mine, three months

[1] Read before the Chicago Surgical Society, January 8, 1908.

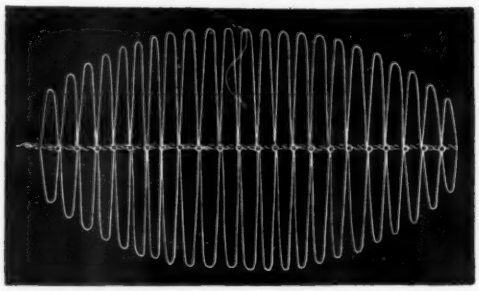
before I saw him, but the little offender had not been found and removed. When I operated upon him there was great difficulty in locating it, but this was finally accomplished, and, in spite of the fact that much pus was encountered, I implanted a small filigree beneath the edges of the aponeurosis. This was done on November 17, 1905: the wound healed slowly; he is now at work with a firm abdominal wall, and experiences no trouble from the wire.

Case 25. This is a most interesting case and teaches a valuable lesson with reference to the use of the filigree. In this instance I removed a fibro-myoma of the uterus, also two complicating pus tubes. Apparently the abdominal fat was infected at that time, since the wound suppurated profusely, necessitating its being opened in its entire length to the depth of the aponeurosis. The patient was a very stout washerwoman, accustomed to lifting heavy weights; hence, on June 14, 1907, I implanted a large size filigree in front of the aponeurosis, supposing that this would answer all practical purposes. This was done one month after the original operation, but as soon as she got out of bed a bulging was noticed, which very soon developed into a hernia as large as a cocoanut, thus demonstrating conclusively that it is improper to implant a filigree in the abdominal fat; the edges of it must lie behind aponeurosis or muscle. This is the only instance in which I ever placed it in the fat, and the only recurrence which I have to record.

Case 31. A boy, 16 years of age, was drained for appendicitis by one of my assistants during my absence from the city. About two weeks later I opened his abdomen for a secondary collection of pus in the pelvis, and at the same time removed his appendix. By both of these operations his abdominal wall was very considerably damaged; hence, on July 10, 1907, three weeks after the second operation, I implanted a filigree beneath the aponeurosis, with the result that he was up in two weeks; has been back at work for the past five months, and notices no bulging or discomfort.

Case 32. This patient, a man, 28 years of age, was operated upon for suppurative appendicitis by one of my assistants, and the appendix removed. A fecal fistula developed, and a greatly weakened segment of the abdominal wall was the result. Ten days after the first operation, two days after the fecal fistula had closed, on September 21, 1907, a filigree was introduced under the aponeurosis. An iodoform dermititis of the most severe variety resulted from the packing of the defect between the lips of the wound. However, he was out of the hospital in less than three weeks, and in four weeks walked in to announce that his wound was completely healed and he himself ready for work again.

Case 36. A lady, 33 years of age, was subjected to the Wertheim procedure for cancer of the uterus. A few days later the skin sutures had to be removed to evacuate a large quantity of pus which had accumulated in the fatty layer. She was a very fleshy woman, accustomed to doing her own housework, and, fearing a hernia, we implanted a filigree beneath the recti two weeks later, on November 27, 1907. An instructive feature of this case is that the lips of the wound were approximated in a part of its extent, and no packing



This filigree is woven of No. 30 silver wire; the method of construction makes it so pliable that the natural mobility of the tissues is unhindered by its presence.

used between them. This is the only patient in the series who developed septic symptoms after this form of operation. Her temperature went up to 103½, and the lips of the wound had to be separated slightly to admit the escape of pus. The three sutures were loosened somewhat, though not removed; the filigree was not disturbed; she was placed on her abdomen to allow the escape of pus, and no further harm resulted.

One filigree was removed, as above stated, by mistake and without my knowledge. The other five do not constitute a large number, but surely enough to prove that a pus wound, with a filigree in it, heals in very much the same manner that any other granulating wound is supposed to do. The periods which have elapsed since the five permanent implantations are as follows: two years, one year, six months, four months, and two months; a total of fifty months, that is, an average of ten months to each patient. As stated in Case 25, one recurrence was noted when the contrivance was used in the subcutaneous fat; with this single exception, every one of these abdominal walls is normal. There is nothing to attract the patient's attention to the filigree containing scar.

OPERATIVE TECHNIQUE.

1. The wound is carefully cleansed and dried in order that any exudate which may be present shall not be accidentally spread.

2. By blunt dissection the previously cut edges of the anterior rectus sheathes, or better still, the edges of the recti muscles, are elevated, and these structures separated from their posterior sheathes for the full length of the wound, and laterally far enough to accommo-

date a filigree of the size desired. (In case the wound does not happen to lie in the median line, other muscles, together with their fascial coverings, may be treated in a similar manner in any portion of the abdominal wall.)

3. The cavity thus made is packed for a moment with gauze, soaked in Harrington's solution No. 9, in order to seal up all the open tissue spaces and prevent the dissemination of infective material.

4. A filigree, the size of the cavity which it is to line, is inserted, and the lower end anchored with a catgut suture in the lower extremity of the wound, since this is the point at which intra-abdominal tension will be greatest when the patient is in the erect posture.

5. If the wound be not more than eight centimeters in length, one suture is sufficient. A strand of silk-worm gut is carried through all the structures overlying the filigree, but is not tied in the usual manner. Each end is knotted to a button lying on the skin, to either side of the wound, thus leaving an open cavity, the walls of which approach one another to within one centimeter. This small defect is lightly packed with iodoform gauze, to facilitate drainage. In the case of a longer wound, two or three similar sutures may become necessary. This gauze packing is left in situ several days, and not replaced when it is once removed. The dressings are changed as often as necessary.

It is very interesting to watch one of these wounds after the filigree has been implanted. In a very few days granulations have so completely covered it that it cannot be seen from the front.

I do not wait to get these people up and out of the hospital until the skin has completely formed over the defect, nor do I consider this necessary. The stitches are cut and the patients are allowed to get up at the expiration of two weeks after the implantation, and this having been done usually about two weeks after the original operation, they really do not remain in bed as long as do many whose wounds are simply drained and allowed to heal by granulation.

As to the proper time for implanting a filigree in a pus wound, no rule which will cover all cases, can be laid down; I will merely state that I have usually waited until general conditions were favorable, that is, until the wounds were clothed with healthy granulations, and free from gangrenous tissue, or pockets in which pus accumulated. Naturally, fistulæ, fecal and otherwise, must be disposed of before a proper bed for a filigree can be established.

In this series of cases the intervals which elapsed between the original operation and the implantation, was in 1 case, one month; 3 cases, two weeks; 1 case, ten days; 1 case, none.

I can imagine appendix and other cases in which the wall is soiled enough to preclude ordinary suture methods, cases in which a supplementary drain might take care of intra-abdominal exudata, as fitted for the implantation of a filigree while the patient is on the table for the first time, although, as I say, but one such has presented itself to me, viz., Case 16.

Dr. Ochsner's remarks, in discussing a paper which I read on an allied subject at Boston in 1906, suggested to me the advisability of X-raying some of these patients, to find out exactly the present status of the filigree. He stated that wire sutures in the abdominal wall had the unfortunate tendency to break into little bits, and, by irritating the skin, necessitate removal. I managed to induce two of my older patients to submit to the procedure, choosing especially those in whom it was impossible to close any of the abdominal layers, excepting skin and peritoneum, cases in which the affected portion of the wall then consisted of skin, wire, and peritoneum.

The first of these was Case 3 of my entire series. She was examined five and a half years after the implantation of two filigrees for one of the worst post-appendiceal herniæ which I have ever encountered. The plate showed two filigrees still in place, one over the other, although some one-third of the cross wires were broken. In spite of this there is no bulging at the site; there has never been any complaint from the presence of the wires, nor has she worn any form of bandage or supporter since my operation.

I further examined Case 14, more than two years after the implantation of one of the largest filigrees I ever used. In this instance, I had divided the abdominal wall in the median line, from the pubis to a point consider-

ably above the umbilicus, for the removal of a large uterine fibro-myoma, as well as for the treatment of a good-sized umbilical hernia. In this instance, I could not approximate the atrophic recti, or anything else but skin and peritoneum, in about one-third the length of my incision. The X-ray plate showed the filigree nicely in position, but few of the cross wires being broken. The result is here perfect from every standpoint. There is no complaint regarding the presence of the contrivance, and she has not worn a supporter for one and a half years.

A still more interesting case is one related to me by Dr. Carman, of this city. A patient was sent to him for X-ray examination, and to his surprise he found the broken up remnants of a wire net work in the abdominal wall. On inquiring into her history it came to light that she had been operated upon three times for a post-operative hernia, which was finally cured the fourth time, a couple of years since, by the introduction of a filigree.

These three instances are enough to show that the filigrees do break up, to some extent, in the wounds, but make no symptoms in consequence, in cases where they have not been placed too close to the skin. It is, however, important to note that these cases are as completely cured as though the wires had remained intact. My records, extending back six and one-half years, sand covering thirty-six cases, demonstrate this point conclusively. I do not know whether it is that the wires which do remain intact offer sufficient support to keep the scar from stretching, or whether it be that the presence of the contrivance leads to the formation of such an excessive scar that it will not stretch, even after the wires break; but this much I must insist on, that many patients are well to-day, years after I substituted skin, wire and peritoneum for a large hernial opening. It will be granted at once that skin and peritoneum *alone* are not effective in maintaining the integrity of any portion of the abdominal wall.

In order to study the results of implanting filigrees in infected wounds in a dog's abdominal wall, I secured a male, black, mongrel dog, weighing eighteen pounds, and on November 18, 1907, implanted three filigrees, 2 x 4 centimeters in size, in the following situations: One high up in the middle line, beneath the recti muscles; one close to the free margin of the ribs, on the right side, beneath the edges of the external oblique muscle, and one on the left side, high up, and just under the skin. In each of these instances, one stitch was used for drawing together the tissues superimposed upon the filigree. No aseptic precautions were observed; a large cotton dressing was applied, and the animal turned loose. A few days later he was found to be in perfect condition but minus a dressing. All three wounds were completely healed in twenty-four days, there being a stitch abscess in the median as well as in the left of the three. There was absolutely no bulging, although the animal had been active all this time, and without a supporter or the slightest attention.

In order to study the effects of increased intra-abdominal tension upon such a wall, the following experiments were made: As a trial of our projected method we killed and skinned a four-pound adult female cat on December 13, 1907. A canula, connected with a hydrant, as well as with a mercury pressure gauge, was tied in the rectum and the stream of water turned on. The mercury rose to sixty centimeters, when water gushed out of the open œsophagus into a wound in the neck. After this had been secured by clamping the animal's neck, the stream was once more turned on with the effect of something giving way inside at fifty-eight centimeters. We could not determine at the time whether this was an intestine or the diaphragm. With the third attempt the right inguinal region blew out, the mercury standing at forty-three centimeters. Our only explanation for this segment of the abdominal wall giving way under a much lower pressure than it had sustained earlier in the experiment, is that the water we used exerted a deleterious effect upon the tissues. With this idea in view we decided to use salt solution in our future work of this nature.

On December 14, 1907, twenty-six days after the three filigrees had been implanted, we killed the dog to which reference has been made. His neck was clamped, a canula tied in the rectum, and after he was skinned (except the immediate vicinity of the three scars), salt

solution was injected into the abdomen. Immediately the loops of intestine could be seen filling up. At thirty-five centimeters the stomach ruptured, and the contour of the abdomen became absolutely symmetrical. It was noted at this time that the œsophagus was distended with fluid below the clamp which held it. With the mercury at fifty centimeters, the right of the three wounds blew out, that is, the one in which a filigree had been placed below the edges of the external oblique muscle. The specimen is presented herewith for your inspection. The interior abdominal wall shows wide omental adhesions at the site of the median filigree, which, it will be remembered, lay beneath the recti, whereas the left of the three contrivances, which was placed in the fat, was found to be freely movable on its base, and consequently afforded no protection whatever.

It is gratifying to note that the wound treated in just the way I have advised in these cases stood the greatly increased pressure from behind, as did normal segments of the abdominal wall, and this only twenty-six days after the filigree had been implanted in an infected wound. Behind this contrivance was nothing but peritoneum and an extremely thin transversalis fascia; in front of its median portion, nothing at all, until granulation tissue changed to scar.

It seems that the solution of this problem resolves itself into three questions:

1. Does a filigree protect against hernia in general? My own experience, with thirty-six cases, covering a period of six and a half years, seems to me to prove this point without a doubt.

2. Will a filigree heal in a pus wound? That such is the case I have shown to be true in five instances above mentioned, as well as in an equal number where a clean wound became infected after the implantation of such a contrivance.

3. Is any protection needed against the occurrence of rupture in an infected wound? The experience of the surgical world answers this question, and demonstrates conclusively the likelihood of a post-operative hernia under such circumstances.

If then a filigree does protect, will heal in an infected wound, and some sort of artificial aid is needed in these cases, may I not, reasoning on these premises, logically conclude that a filigree is of value in an infected wound? Surely prophylaxis is to be preferred to any therapeutic measure. Why not then implant a filigree before a hernia makes its appearance, since this has been shown to be free from any undesirable consequences?

THE DIFFERENTIAL DIAGNOSIS OF DUODENAL ULCER AND GALL-STONES[1]

By W. D. HAINES, M.D., Cincinnati, Ohio

PROMINENT symptoms in common are pain, vomiting, and gas; together with the deleterious influence which these symptomatic manifestations exert on the general health of the patient.

It is to a correct interpretation of these symptoms and their influence that we must turn in an attempt to distinguish the two diseases, essentially distinct entities yet closely related symptomatically and anatomically. Both complaints are referred to the upper right quadrant of the abdomen, and while the pain in cholelithiasis, which is sharp, decisive and of sudden onset, is referred to a point opposite the right ninth costal cartilage, it may radiate over the entire right side of the abdomen and not infrequently finds expression in the right shoulder joint. Again, the pain may be most intense in the region of the tenth dorsal vertebra.

Jonas has shown that the gall-bladder and ducts receive their nerve supply from the terminal filaments of the four lower dorsal and two upper lumbar nerves. The nerves,

[1] Read before the Western Surgical and Gynecological Association, December 30 and 31, 1907, St. Louis, Missouri.

after leaving the cord, pass forward, over the diaphragm and between the folds of the gastro-hepatic ligament. This explains not only the pain in the back but also the diaphragmatic spasms which so often accompany gall-stone attacks.

The attack causes the sufferer much anxiety; profuse perspiration and vomiting follow shortly after the first onslaught of pain, and great exhaustion remains after the paroxysm has subsided.

Vomiting, if present, is characteristic in that the ejected matter is bile-stained, consisting largely of mucus and affords no relief to the patient. Hot fomentations may give temporary relief, but full doses of morphine are usually required to allay the terrible suffering.

The symptoms disappear as suddenly as they came, and the patient in the course of a few days will show little trace of the scourge through which he has so recently passed.

In duodenal ulcer the pain recurs at intervals, is less sudden of onset and severe in character; it is described as a burning or gnawing sensation which may last a few days or continue for months after the primary attack.

Unlike the lancinating pains of gall-stones, pain in this disease is markedly influenced by the presence or absence of food in the stomach. A certain degree of relief invariably follows the ingestion of a full meal, lavage of the stomach, or the drinking of a quantity of alkaline fluid.

The explanation for this is found in the dilution or neutralization of the stomach secretions, which are always hyper-acid in the early history of duodenal ulcer. The pain or distress in ulcer cases is greatest four or five hours after a meal has been taken, and is due to the passage of stomach contents over the sensitive, ulcerated mucosa lining the duodenum.

Spasm of the pylorus is a frequent accompaniment of ulcer, but wholly unknown in early gall-stone cases.

Spasm of the diaphragm is evidence of severe pain, which if referred to the region under consideration indicates gall-stones, as ulcer pain, in the absence of perforation, is not of sufficient severity to produce this symptom.

Gaseous distention speaks for ulcer, and the accompanying pain quickly subsides after expulsion by eructations or vomiting. In the absence of pyloric spasm or obstruction, with a fair degree of stomach motility, ulcer cases feel best immediately after taking food.

Muscular rigidity and local tenderness are present in both ulcer and stone cases. Mr. Moynihan told the writer that he had frequently observed a small hypersensitive spot in the skin covering the abdomen, directly over the ulcerated area. It is no larger than a sixpence and he attaches much value to this phenomenon in differentiating ulcer.

It has been definitely determined by clinical evidence and operative procedure that pain in duodenal ulcer is due to:

a. Passage of acri-acid stomach contents.

b. Distention by gas.

As an illative consequence, pain or distress will be greatest in those cases of excessive acid or great distention; on the other hand, very little discomfort may be present in ulcer cases where little, or as Einhorn has said, "No acid is found."

It is in this last variety of ulcer, latent it is called, whose first symptoms may be those of perforation, that the diagnosis is impossible until the calamity of rupture presents.

Vomiting is of less value as a symptom than either pain or distention, but it is well to remember that vomiting is full and free, followed by marked relief, and ceases promptly in ulcer cases, leaving little depression and no nausea. No relief is obtained nor does vomiting cease with emptying stomach contents in stone cases, but a continuous nausea and occasional vomiting of bile-stained fluid continue throughout the attack in recurrent cases. If the diagnosis is established early and treatment instituted at once, vomiting may never appear as a symptom in gall-stones.

In late or recurrent gall-stone histories, vomiting is a prominent feature and the same may be said of chronic ulcer, but the slight, transitory disturbance of the one and the invalid dealing influence of the other, will materially assist in putting one right in the diagnosis.

The far-reaching, baneful influence of the lack of nutrition or the calamity of perfora-

tion are the features most prominent in many ulcer cases when they reach the hands of the surgeon. The patient eliminates one article of diet after another, until he is reduced to starvation rations ere relief of more or less permanency is obtained.

Hemorrhage occurring during an attack of gall-stones is accidental, but it is prominent as one of the late manifestations in ulcer.

One of the first indications to attract the attention of the observer may be the presence of blood in the stool, but one should not forget it is a late and dangerous symptom, and that small hemorrhage from duodenal ulcer may be followed by great depression, collapse, and fatal termination.

Jaundice, like hemorrhage, is a late symptom, and may be present in either of the conditions under consideration. This symptom is more constant in stone than ulcer, and while the obstruction is most frequently due to the lodgment of a calculus in the former and an inflammation of the choleductus in the latter, adhesions may produce jaundice in both diseases in the absence of either of the above factors.

Jaundice, following lancination pain of sudden onset, localized in the upper right quadrant of the abdomen, radiating over the right chest wall or accompanied by pain in the right shoulder, would warrant a conclusion of the presence of gall-stones. Do not, however, be surprised if ulcer is found to co-exist with stone, as the initial pathology is, according to many competent observers, one and the same, that is, altered stomach secretions.

Constipation is one of the early effects of duodenal ulcer. It may be present very early in the history of the disease, and is due to altered secretions, absence of flora, pylorospasm, and motor insufficiency. Constipation may be very obstinate and constitute the dominant note in the history.

Although the well-known, significant clay-colored stools are pretty constantly present in gall-stones, constipation is the exception rather than the rule in these cases.

By a careful reading of the early histories of these afflictions one may be fairly accurate in his decision, but in the old cases, where repeated attacks have resulted in inflammatory adhesions, impacted stone, pancreatitis, and impaired motor and secretory stomach function, with their blighting influence upon the general economy, one is confronted by an almost endless pathological chain, whose correct interpretation is exceedingly difficult.

Finally, in a certain percentage of the chronic and some of the acute cases of stone and ulcer, differentiation will be reserved for that erstwhile, much used, sometimes abused, method of diagnosis, "Exploratory incision."

DEPARTMENT OF TECHNIQUE

PREPARATORY AND POST-OPERATIVE TREATMENT[1]

By JAMES E. MOORE, M. D., Minneapolis

As a rule, preparatory and post-operative treatment, aside from the sterilization of the operative field and the dressing of the wound, have more to do with the comfort of the patient than with his recovery, for emergency cases very commonly do well, and we frequently perform successful operations away from home and leave the after treatment to a physician little skilled in the care of surgical cases.

In all but exceptional cases, where some organ — the bladder for example — has to be prepared for operative procedures, prolonged preparatory treatment is unnecessary and inadvisable. It is not in keeping with modern surgery that we should "operate our patients off the street," but it is sufficient to have the average patient enter the hospital on the day preceding the operation.

Much harm is being done by starving patients and giving them heroic doses of cathartics before operation. An operation of sufficient importance to require any preparatory treatment is a trying ordeal for the patient, and should be prepared for as for any other trial of endurance. The patient's resisting powers should be brought up to the highest possible standard. We should not think of preparing a person for any other trial of his strength by hypercatharsis and starvation diet. On the contrary, we should give him good, nourishing food and keep his bowels regular. If a patient were to come to us weakened by a diarrhœa, we would naturally build him up before performing an important operation upon him. Why then should we weaken him by cathartics before operation? When a patient's bowels are regular, he is better without a cathartic, except in abdominal and rectal cases, and he should have regular diet up to within a few hours of the time of operation.

In weak patients, and where a very severe operation is to be performed, a hypodermic of one-thirtieth of a grain of strychinia just before operation is helpful.

The operative field should be shaved, thoroughly disinfected, and a sterile dressing applied the evening before the operation. The application of wet dressings and soap poultices at this time are objectionable, because they are unnecessary, and are very liable to deprive the patient of a necessary night's rest. The field should be thoroughly rescrubbed with soap, water, and gauze just before the operation. It is a mistake to use a stiff brush, so that the skin looks like a boiled lobster. Bichloride and other chemical solutions are usually applied at this time from force of habit, but, as now used, their value is certainly questionable, and they will doubtless soon be discontinued just as many other useless things have been eliminated from our technic. Ether should be used when the skin seems oily, and finally alcohol, to harden the skin and close the pores.

The average patient fears the operation much less than he does the anæsthetic, and it is very helpful to be able to say to him that the person who will administer his anæsthetic has had a large experience and gives it so that the patient does not suffer and is certain to regain consciousness. Every operating room should have an experienced anæsthetist, because it adds to the patient's comfort and safety, and allows the surgeon to give his undivided attention to the operation. No one thing has added more to my comfort and success than my trusted anæsthetist, who has served me faithfully for several years. Many patients have lost their lives because the anæsthetic was so poorly administered that technical mistakes were made while he was being resuscitated.

There are many things pertaining to the operation itself which have a decided bearing on the after treatment. Careless and rough handling of the patient while he is unconscious is a common cause of discomfort and pain afterward. While unseemly haste in an operation is to be deprecated, we should not keep the patient lying on an iron table and inhaling the anæsthetic any longer than is absolutely necessary, because the former causes backaches, and the latter is conducive to bronchitis, pneumonia and nephritis. There is no doubt but that the hard operating table is the cause of much discomfort during convalescence, and clean pads and cushions, well covered with sterile sheets, should be placed between the patient and the table. A

[1] Read before the Western Surgical Association.

groove running lengthwise in the table prevents undue pressure upon the spinous processes, and saves subsequent suffering from that source. The severe post-operative backache as commonly complained of is due to the bruising by the hard table, and to the spraining of the muscles of the back from a faulty position maintained for a long time. The spraining can be prevented by placing a pad under the small of the back during the operation, so that the natural forward curve of the spine in the lumbar region can not sag. In our Northern climate, no operating table should be without a heating device for cold weather. The electric is the most elegant and convenient, but a hot water tank or coil is equally efficient. Our tables all provide for drainage now, and we should see that the drainage is not so interfered with that the patient lies in a puddle of water during the operation.

The patient always thinks the stitches and bandages are too tight, and it is very important that the surgeon should know that they are not so. Most stitch abscesses are caused by tight sutures, and tight bandages have been the cause of untold suffering.

Thirst is the greatest source of suffering after operation, and in the management of this symptom many mistakes are made. A few years ago nurses were taught that patients should not have water after abdominal operations, and they gradually extended that prohibition to all who had recently taken an anæsthetic. Unfortunately for suffering humanity, this teaching still prevails in many hospitals. This is a piece of barbarism equal to that of our forefathers, who allowed their typhoid fever patients to die from thirst. My patients all get water after operation, and they convalesce much more comfortably than those who are deprived of it. Even after stomach operations, with our modern technic, patients suffer so little from vomiting that water can be given in moderate quantities by the mouth from the very first, so that, with the aid of salt water enemata, they need not suffer from thirst. Patients are deprived of water on the theory that the water causes vomiting. A certain percentage of patients will vomit after an anæsthetic, no matter what anæsthetic is used or by whom administered, and depriving them of water will not prevent it and does add to their suffering. I once had occasion to take an anæsthetic myself and naturally had a raging thirst soon after. Following a heated controversy with my nurse I drank a glass of beer. I must admit that it tasted better going down than coming up, but it did me good both ways, for it took the edge off my thirst, and washed out my stomach, which stopped my vomiting. A full glass of water given to a patient will frequently stop his vomiting by a process of natural lavage, and with much less discomfort than would be caused by passing a stomach tube. In a case of persistent vomiting nothing is so efficient as lavage, but it is always trying, and a disagreeable ordeal for both patient and attendant. Any vomiting that might be caused by a drink of water will do no harm, for with our modern hæmostasis and wound closing, we need have no fear of secondary hemorrhage or the wound opening. The only possible objection is that the act of vomiting causes pain, but if left to the patient he will choose the water every time, for the water is grateful to him, and it is much less painful to vomit when there is water in the stomach than when it is empty.

All surgeons agree that the patient is better without food for a time after operation, for he does not suffer from hunger and an effort to force feeding would surely disturb his stomach. Definite rules as to the time of feeding and the character of the food can not be satisfactorily formulated. The patient's appetite and taste are the best criteria. He does not crave substantial food at first, but as soon as he does crave it he should have it. Many a patient has gotten out of bed wabbly on his legs, at a time when he should have been strong, simply because he has been fed on slops. One who had not undergone an operation would wabble under like conditions.

Aside from opiates and mild cathartics, medicine has very little place in post-operative treatment. My patients get it only to meet definite indications.

Pain is the one symptom common to all patients after an operation, and demands our constant consideration. As already suggested, much can be done in the way of prevention, but after that our sheet-anchor is opium in some of its various forms. Morphia administered hypodermatically is the universal favorite. Codia and other milder preparations are disappointing and should only be used where the patient is known to have a marked idiosyncrasy against morphia. When morphia is indicated, it should be given in full doses — usually one-fourth of a grain — because a smaller dose does not have the desired effect and is just as liable to be followed by unpleasant effects as a larger one. It is our mission on earth to relieve pain, and in post-operative treatment we have a great opportunity. One who denies his patients an opiate after an operation, on theoretical grounds, is in error, and would very quickly change his views were he the patient. At one time I, in common with most surgeons, denied my patients opiates after abdominal operations, on the theory that they caused gas and consequently greater suffering.

My patients differed from me at the time and censured me afterward, and after long experience I am thoroughly convinced that they were right. All patients have some discomfort from gas after the abdomen has been opened, but my patients have infinitely less suffering now than they did when I denied them this boon. Some able surgeons of large experience are now giving a hypodermic of morphia to these patients before they recover from the anæsthetic, as a routine, and while I have not yet adopted the routine, I am inclined to believe that this will eventually be the accepted practice. As long as the hypodermic syringe is kept in the hands of the nurse, and its use discontinued when the surgeon decides that it is no longer needed, any fears of establishing a habit are only theoretical. Post-anæsthetic vomiting is not a contra-indication for the hypodermic, but, on the contrary, it is often helpful in this condition.

The proper care of the bowels after an operation has much to do with the patient's comfort. In other than abdominal cases, the patient will feel better after a bowel movement on the second day, which can be secured by a glycerine enema or a wine-glass of Pluto water. In abdominal cases, where the intestines have not been involved in the operation, the same rule applies, but when the bowel has been operated upon, it is well to wait until the third or fourth day for fear of injury at the seat of operation. In one of my cases an over-zealous orderly administered a high enema on the day after an operation for suppurative appendicitis, with the result that part of the enema came out through the wound. When the patient is distended with gas, a Nobles enema should be given, and repeated if necessary. There should be no exceptions to this rule, because the danger from distention with gas is greater in any case than it would be from an enema, and this enema is the best known means of causing the expulsion of gas.

In the care of the bladder, the catheter should be used only as a last resort, and then with the utmost care. Hot applications and change of position, even to getting out of bed, will usually enable the patient to empty his bladder voluntarily.

In every case the question naturally arises, when shall the patient get out of bed? All agree that old people should get up at the very earliest period possible, for reasons well understood, but there is still a great diversity of opinion as to when a younger patient should get up. A few years ago we kept patients in bed longer than we do now, but we found that, instead of shortening convalesence, it lengthened it. The tendency now is for the pendulum to swing too far the other way, for many patients have had their convalescence unduly prolonged through efforts to get them out of bed too soon. It is not well to establish fixed rules in this matter. It is far better to allow each patient to be a law unto himself. With foolish patients, the surgeon must be arbitrary and settle the question in accordance with his judgment, but sensible patients can often be consulted in this matter to advantage. The average patient may be allowed to get up as soon as he can do so comfortably.

Every abdominal operation is of sufficient importance to justify the patient in remaining in bed for from one to three weeks, owing to circumstances, and he is usually content to do so. There is no crying need for getting a patient out of bed the day after an abdominal operation. He is safer and more comfortable in bed for a few days at least. I recently operated upon a colleague for chronic appendicitis, who made the statement that he intended to get out of bed the day after operation: that staying in bed for a week after such a simple operation was all nonsense, to all of which I readily acceded, with a mental reservation. On the first day he quietly curled up on his side, and I smiled without comment. On the second day he was still in bed, and when I asked him why he was not up, he mildly suggested that I go to a warmer climate, and very emphatically stated that his viewpoint had changed.

A NEW FORM OF SURGICAL ADHESIVE PLASTER[1]

By CHARLES LESTER LEONARD, A. M., M. D., Philadelphia

The firm fixation of aseptic gauze dressings has been a problem that has been solved in various ways. Their flexibility, while advantageous in their application, has decreased their value as fixation dressings. The application of ordinary adhesive plaster affects only the superficial layer and is cumbersome and in some cases unsightly.

These and other difficulties can be met by a new form of Janus or double-faced plaster which is now first introduced for this purpose in surgical procedure. This plaster has a double coating. On one side zinc oxide and on the other plain rubber adhesive. Thus the plaster can be applied directly to the skin and covered with a bandage or can be made to hold the initial end of the bandage in place. It can also be utilized to hold compresses and splints in place insuring absolute fixation in their original position. Applied in strips between the layers of bandage it adheres to both, fixing them intimately together, preventing any displacement and increasing their rigidity, and consequently the support obtained for the parts. It is very serviceable, neat, and effective as a method of fixing the loose end of any bandage, a transverse strip, the width of the bandage in length, beneath the end holding it firmly and neatly in position, a very desirable result, especially in dressings on the head and face. Local dressings, as in boils, abscesses, or ulcers, can be held in place by strips concealed beneath the final layer of gauze.

Other applications of this form of surgical adhesive plaster will readily suggest themselves to the surgeon when employing it in practical work, where it will be found particularly useful in fixing dressings, pads, or splints to the skin, and in rendering dressing compact, firm, and neat.

Unknown to the author it has for some time been manufactured in sheets, seven by twelve inches in size, as Janus plaster by the J. Ellwood Lee Co., of Conshohocken, but it has not been utilized in surgical dressings or previously made in a form suitable for surgical application. Its only use has heretofore been in the retention of wigs and toupees.

They have at the author's suggestion now manufactured it in five-yard rolls, one inch, one-half and one-fourth inch wide, and can furnish it, if desired in sterile packages.

THE TREATMENT OF FIBROID TUMORS OF THE UTERUS COMPLICATED BY PREGNANCY[2]

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The surgical treatment of uterine fibromyomata has reached such a degree of perfection in the hands of accredited operators that further improvement must be limited to the special varieties and complications which are presented in this very common class of neoplasms. It is the purpose of this paper to invite attention to one important phase of this subject, which, though considered by many writers briefly and with numerous clinical reports, has not as yet been placed upon the practical basis of uniform and accepted methods of treatment. I allude to the indications for surgical intervention in cases of fibromyomata complicating pregnancy, with especial reference to the time for such intervention and the plan and scope of the operative procedure in the varying conditions presented.

It is well known that uterine fibromyomata are very commonly associated with sterility. Veit estimates that 8 to 10 per cent of married women are sterile, but that quite 30 per cent of married women with uterine fibroids are sterile. Again, the period of greatest fecundity is before the age of 35 years, whereas the period at which uterine fibromyomata most frequently occur is after 35. And, moreover, so great are the conservative powers of the pregnant uterus that small tumors in any part of the uterus very rarely interfere with pregnancy and labor; comparatively large tumors in

[1] Read before the Philadelphia Academy of Surgery, December 2, 1907.

[2] Presented to the Southern Surgical and Gynecological Association in New Orleans, December 17, 1907.

the upper part of the uterus only exceptionally necessitate surgical intervention, and moderately large tumors, growing from the lower uterine segment and resting within the true pelvis, do not invariably prove insuperable obstacles to spontaneous delivery at term. From these facts it is an obvious deduction that uterine fibromyomata and pregnancy are only rarely associated, and that surgical intervention will only be necessary in a judiciously selected proportion of cases. In connection with the declaration that pregnancy and uterine fibromyomata are rarely associated, the fact must be considered that both pregnancy and uterine fibroids are very common conditions, and the expression "rarely associated" is to be taken relatively. Every surgeon engaged in gynecological work meets with this condition, and the aggregate of such cases is a large number.

Since fibromyomata are composed histologically of the same elements as the uterine wall they undergo in pregnancy the same change. The tumor, with the entire uterus, has an increased blood supply and active growth. Tumors so insignificant in size as never to have been observed, under the stimulus of pregnancy grow to appreciable proportions. Growths of moderate size become conspicuous and oppressive as pregnancy advances. The increased vascularity of the uterus begets softening of the tumor, and edema of the tumor is common. Hemorrhage into the tumor has been observed; cystic degeneration and necrosis are changes to which the tumor substance is liable during pregnancy. The growth of the tumor *pari passu* with the increase in size of the pregnant uterus accentuates early all the ordinary pressure-symptoms of the adjacent viscera, especially as to the bladder and rectum. A subperitoneal fibromyoma which has become pedunculated has been observed with twisted pedicle and consequent necrosis as a result of the increased mobility incident to its ascent from the pelvis to the abdomen. This necrosis, as under normal conditions, is more common with submucous tumors, but may obtain in subserous and interstitial growths also. When the blood supply is reduced during the puerperium necrosis is more apt to occur. The tumor may so interfere with symmetrical contraction of the uterus that excessive and even fatal hemorrhage may arise from patency of the uterine sinuses after the placenta is detached.

During the course of pregnancy numerous abnormalities arise from the mechanical effects of the tumor. The uterine end of the Fallopian tube may be so obstructed by the growth that the ovum develops in the tube. In C. P. Noble's statistics, of 19 cases of fibroid tumors, associated with pregnancy, 6 were ectopic. When the cavity of the fundus is distorted by the growth, the ovum and placenta are often implanted low down, in some instances producing placenta previa. Veit states that instead of the head presenting in 95 per cent of the cases, as obtains in normal labors, in pregnancy associated with fibromyomata there are only 54 per cent of head presentations, with 28 per cent of breech presentations, and 19 per cent of transverse presentations, the labor being thus made more hazardous in consequence of the complication. Of course, the most serious effect exerted is the obstruction directly to the delivery of the child by the tumor or tumors filling partially or entirely the pelvic cavity. The pain resulting from the abnormal pressure during the latter months of pregnancy, and the moral influence exerted by the woman's knowledge that an abnormality exists, deserve mention in this connection.

It is apparent from these observations that the association of pregnancy with uterine fibromyomata adds very materially to the dangers of this condition; that new dangers will arise from the combination of the two; and while the clinical fact that a considerable proportion of the cases come through in safety is indisputable, the mortality of the entire number of cases left to nature is high. That statistical studies of such surgical subjects as this are misleading, and in great part unobtainable is well known. Fatal cases are rarely reported. The mortality of this condition, with existing statistics, is high, and if all cases treated non-surgically could be obtained, the showing would be discouraging indeed. The following extract from the report published by Esch of Olshausen's clinic will illustrate the results of obstetrical (non-surgical) and surgical treatment in three illustrative cases:

CASE 1. The subserous myoma filled the greater part of the true pelvis and the pouch of Douglas. It was a foot presentation. After a labor lasting two days, the membranes having ruptured, the tumor had risen, rendering delivery possible. The baby succumbed on the sixth day to injuries sustained at birth, and the puerperium was complicated by thrombo-phlebitis with pulmonary embolism on the part of the mother.

CASE 2. Eighteen months later the same mother was at term. The child presented by the occiput. By this time the pelvis was entirely occupied by the tumor. After 3 days of labor without results, a classical Cesarean section was performed. At the same time the myoma was removed from the posterior uterine wall. On the twenty-first day both mother and child were discharged in good condition.

CASE 3. The pelvis being filled by subserous immovable myoma and labor having continued to 24 hours without results, Cesarean section with supravaginal amputation of the uterus was done. The child was saved and the mother made an uneventful recovery.*

*Zentralbl. f. Gyna., vol. xxx, 17, 1906.

I would call especial attention to the results of delay in the first two cases, and that operation was done in the third case after 24 hours of futile waiting on nature.

In further illustration of the advantage of prompt operative intervention in properly selected cases, I desire to offer the following cases from my personal experience:

CASE 1. Mrs. T. M. J., of Vincennes, Indiana, age 32 years, was referred to me by her family physician on October 22, 1907. She was married in June of the present year, and had missed three menstrual periods. The signs and symptoms of pregnancy were manifest. Three weeks previously 2 indurated tumors were detected on each side of the lower abdomen, the tumor on the right side being larger than the one on the left side. The tumors grew rapidly, and were recognized as fibromyomata of the uterus by the family physician. On examination by the bimanual method it was apparent that the tumors were uterine, the one on the left side being more mobile than that on the opposite side. The tumors were growing from the lower segment of the uterus and were within the true pelvis. On October 25, 1907, I did abdominal section and removed both tumors by myomectomy. Both tumors were subserous; that on the left side of the uterus having a broad pedicle, while the one opposite was sessile. Both were readily removed after incising and separating the peritoneum at the base, and suturing with cat-gut arrested the hemorrhage, which was not great, thus completing this part of the operation. There were no other tumors, the uterus being quite normal otherwise. No uterine contraction followed the operation; convalescence was prompt and without untoward incident of any kind, and pregnancy has proceeded in a perfectly normal way up to the present time.

CASE 2. (Abstract) Mrs. W. E. J., age 37 years, was referred to me by Dr. T. H. Garvin, of Horse Cave, Ky. The patient was supposed to be in the fifth month of pregnancy, and was very large. The pelvis was packed with an interstitial fibromyoma of the uterus. The cervix could barely be reached by the finger upon vaginal examination, having been carried up above the pubes. The symptoms of pregnancy were present. The patient was anæmic and emaciated, and had suffered for weeks with nausea and pressure symptoms. Abdominal section was done and the entire tumor removed by hystero-myomectomy. After the tumor was removed it was incised and the fetus appeared in the upper portion of the tumor mass. The convalescence was rather tedious on account of the patient's enfeebled condition, but she made a good recovery, and left the hospital quite well at the end of the fourth week.

CASE 3. (Abstract) Mrs. T. E. W., of Louisville, Ky., was seen with her physician April 12, 1905. This patient was 28 years of age, had been married nine years; never pregnant until the present, having reached the eighth month of pregnancy, when she was delivered of a dead child. The placenta was retained, and when I was called septic symptoms had appeared. Efforts to remove the placenta had failed on account of the presence of the tumor, which was interstitial and occupied the lower portion of the pelvic cavity. Supra-vaginal hysterectomy was performed, and the patient made a good recovery.

CASE 4. (Abstract) Caroline G., a mulatto woman, age 37 years, of New Albany, Indiana, was referred to me by her physician February 7, 1904. Patient had known for a year or more that she had an abdominal tumor, which had increased very rapidly since she missed her menstruation 6 months previous to the date I first saw her. Examination showed her to be in advanced pregnancy, with a large multinodular fibromyoma packing the pelvis. On April 5th she was admitted to the infirmary with the first pains of labor. The cervix was above the pubes and beyond reach of the finger. Under chloroform anæsthesia, I did abdominal section. The uterus was incised, a female child and placenta were delivered; the uterus contracted promptly. The entire tumor mass with uterus was removed by supravaginal hysterectomy, and the operation completed in the usual way. The mother had an uncomplicated convalescence, and left the infirmary with her child on May 2, which was 3 weeks and 4 days after operation.

I have selected these four cases as illustrating the multiform aspects of uterine fibromyomata, complicated by pregnancy as clinically presented. My entire experience consists of two more cases, in which operation was done in the early period of pregnancy, making 6 cases in all, and all recovered. This is not an exceptional experience, but is about the usual results of operative treatment in the hands of experienced surgeons.

My thesis is that, while indiscriminate operation in uterine fibromyomata associated with pregnancy is not to be advised, the mortality of this condition, when unaided, is so great as to justify an extension of the field of operative treatment, both as to myomectomy and hystero-myomectomy; and every case should receive individual consideration so that a judicious selection of cases for operation may be observed.

TUBERCULOSIS OF THE TONGUE, WITH REPORT OF A CASE[1]

By WM. M. HARSHA, M. D., Chicago

Mr. A. S., married, age 40 years, American, referred to me by Dr. W. D. Herriman; does light office work. Father died at 49 with paralysis. Mother died at 47, some time after operation for cancer of the breast, probably from recurrence in the lung or pleura. He has three brothers and three sisters, all in good health; one sister died in infancy. Personal history good; has had no diseases since those of childhood. Habits good, except smokes a pipe several times a day. Drinks little. Weighs about one hundred and thirty pounds.

HISTORY OF PRESENT TROUBLE

In March of 1907, he bit his tongue on right side, midway between base and tip, and consulted Dr. Herriman, who cauterized the wound with pure nitrate of silver. In six weeks the tongue was completely healed, when he again bit in the same place. Following this second injury, it was treated several times with a strong solution of nitrate of silver. In two or three weeks the swelling at the site of the injury increased, forming a nodule the size of a hazel-nut, which seemed to involve the deeper structures of the tongue. At the apex of this nodule, a small ulcer formed. The patient was then given specific treatment although there was no history of syphilis. The condition of the tongue remained stationary until August, 1907, when I first saw him. He appeared well nourished, and complained of nothing but the trouble with his tongue. The mass on the right border of the tongue was indurated; was not painful, but interfered slightly with phonation and with free movements of the tongue. It presented every appearance of epithelioma. There was slight enlargemeat of a cervical gland on the same side. No physical signs of tuberculosis were found except this enlarged cervical gland. There had been no improvement under specific treatment for several weeks.

The age, history of cancer in the mother, absence of any appearance of tuberculosis or syphilis about the patient all made for diagnosis of epithelioma.

A piece was cut out with scissors and submitted to Dr. Jean Cooke, who reported negative as to epithelioma, and made no diagnosis. It was treated for some weeks expectantly, and following the partial excision for diagnosis, the swelling decreased to half its former size, and the ulceration almost disappeared.

In the early part of November, a small ulcer appeared, half way between the nodule and the tip of the tongue, and in a week, another at the tip; these were both on the under side of the border.

I now made a provisional diagnosis of tuberculosis, which was confirmed by Dr. Cooke, from sections taken from the border of the ulcer. Tubercle bacilli were now found in the saliva and throat secretions.

Dr. Cooke's report is as follows:

"Tissue removed from the tongue, December 2, 1907, Mr. A. S. (for Dr. Harsha). Fixing agent — Formalin, Imbedded — Paraffin, Stain — Hematoxylin and Eosin.

"Sections were made from the growth, cut parallel with the mucous membrane surface of the tongue: The epithelial layer is intact, except in one place, which shows the picture of an ulcer. At this area in the section, and in other places in the tissue, are seen tubercles. The center shows very slight tendency to the formation of a necrotic area. This area is surrounded by a zone of lymphatic cells, in which are found giant cells; outside of this is a reticular zone. Sections were stained for tubercle bacilli, and none were found. Three examinations of the sputum were made, and each time scattering tubercle bacilli were found."

December 7, 1907. The nodule and the two ulcers were freely excised. Hemorrhage was controlled with deep sutures. The wounds were well dried, and dressed with sub-gallate of bismuth, which was continued as a dressing. Healing was prompt and complete. The tongue now appears entirely well, and the patient has regained four or five pounds, lost prior to operation, and feels entirely well, although a few tubercle bacilli are still found in the throat and mouth secretions. He is on tuberculin treatment.

Tuberculosis of the tongue is so uncommon that there is great probability of a mistake in diagnosis in certain forms of the disease. When found without other evidence of tubercular disease, there is greater tendency to error. A majority of the cases reported have occurred secondary to well-marked tubercular disease.

In Il Policlinico, March, 1907, Della Vedova has reviewed the literature. He quotes Fischer, who found 6 cases in 1,500 of general tuberculosis, and Williglk, 2 in 1,317 cases. It may be secondary to tubercular lesions anywhere about the body; but

[1] Read before the Chicago Surgical Society, January 8, 1908. See discussion.

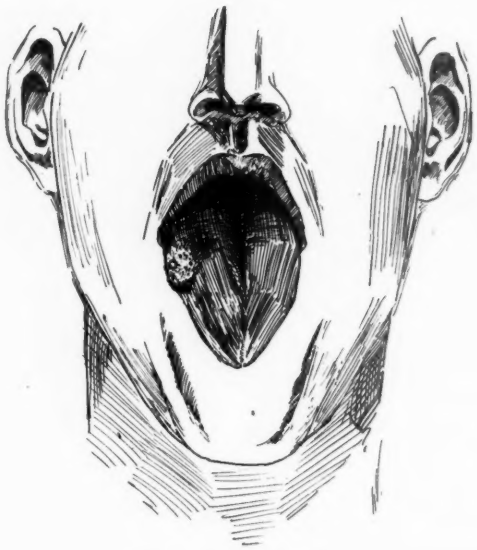

Fig. 1. Showing nodule.

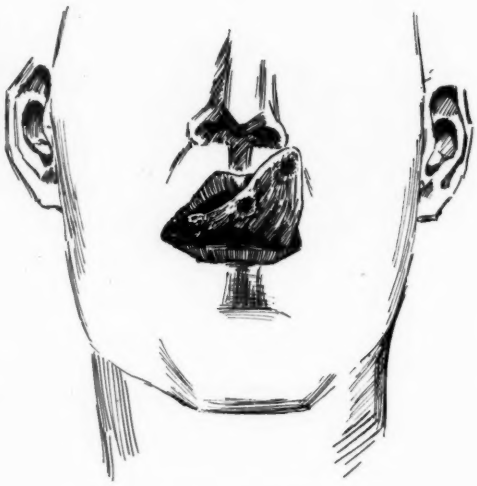

Fig. 2. Showing ulcers formed later.

few reported cases are considered primary. Schiferowitch pronounced 2 of 7 cases observed at Heidelberg clinic, primary, and Hopstein 1 case in 12, from the archives of the Hospital of St. John, of Bonn. These cases are quoted in the article above.

When it is remembered that more than one half of the bodies that come to autopsy show evidence of tubercuiar disease, the difficulty of pronouncing the case primary is evident.

The disease is more frequent in males than females; probably due to habits of smoking and drinking. It may occur at any age, but seems to occur more frequently between the ages of 40 and 50.

In the case reported here traumatism was the exciting cause of the first nodular lesion.

The location in this case, on the margin, and secondarily, beneath the border at the side and tip, is fairly typical, although the lesion may appear on the dorsum.

Also, the primary nodule and the secondary ulcers are characteristic of the two most frequent forms.

The diagnosis is most important, owing to the fact that it has been so frequently mistaken for epithelioma, and unnecessary mutilation of the tongue has resulted. (Warren. Surg. Path. & Ther. 1900,) says Volkmann twice operated for cancer in this disease.

Della Vedova, in the article before mentioned, cites from the literature 23 other cases operated under a mistaken diagnosis, by Bull, Albert Korte, and other well-known surgeons. In most of these cases, extensive operations were done and in some the tongue was entirely removed.

The ulcerating form, especially if multiple, should not be mistaken for epithelioma because of the shallowness and lack of deep induration. The nodular form, with or without slight ulceration, in the absence of other evidence of tubercular disease, can not be diagnosed without a microscopic examination. The clinical course is also important in reaching a correct diagnosis.

The growth may remain stationary longer than an epithelioma is likely to do.

It is most important to differentiate from Epithelioma Syphilis (Chancre or Gumma) and simple ulcer; less frequently, from Actinomycosis, Ulcerating Sarcoma, Adenoma or Acc. Thyroid, and other benign growths.

The lesion, untreated, is considered in some text-books (Am. Text Book of Surg., and Tillman's) as malignant as carcinoma, death usually occurring in from a few months to two years.

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A CASE OF INTERSCAPULOTHORACIC AMPUTATION FOR SARCOMA OF THE ARM

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Removal of a leg, a thigh, or an arm is of daily occurrence and merits mention only when complicated in some unusual way, but the interscapulothoracic amputation — removal of the entire upper extremity — while it is a well-recognized surgical procedure and has been done many times, is still a very rare operation. That I cannot report a brilliant ultimate result is a lasting regret to all who watched the case through its early days of good promise,— but cerebral embolism is a thing that has to be reckoned with sooner or later, and in my case carried off final honors.

The chief indication for the interscapulothoracic amputation is malignant disease of the humerus, or in or about the shoulder joint; and as malignant disease of an extremity invariably necessitates amputation, the rule is to amputate above the neighboring joint, in order to get as far away as possible from the seat of disease and probably affected tissues. White asserts that surgeons at the present day are entirely justified in adopting this method in all such cases.

Statistics show that the average duration of life following the operation is three years. Jeanbrau and Richè have secured records of 24 cases alive after five years and 1 after twenty-six years. Forty-six and two-thirds per cent are reported as non-recurring at the end of one year, but this is, of course, entirely too short a time upon which to base any sort of an estimate, and 8⅓ per cent, according to Cobb, is the ratio when carried a little further.

In view of this enormous percentage of final fatal results — 91⅔ per cent — it would seem the part of wisdom to be a little more radical, and extend the method to all malignant disease existing above the elbow. If now there is virtue in going above the neighboring joint, by so doing we most certainly can get further away from the focus of disease, and, in the writer's opinion, the operation is attended with little more risk to the patient than is a shoulder-joint amputation and is scarcely more difficult to perform.

The operation is a formidable one, but the mortality is peculiarly low. Schultz gives 19.23 per cent before 1875, but this includes the cases before the dawn of either asepsis or anæsthesia. Since then and up to 1896 he gives 13.04 per cent. Berger, who gave us the perfected operation and whose method is generally followed, gives 5 per cent, and Fowler, writing in 1900, gives eight deaths out of 72 cases, a death rate of 11.1 per cent. Konitzer collected 24 cases from 1890 to 1899, with one death, a mortality of 4 per cent., while Douglas, in 1906, affirms that there have been in all 153 cases since 1887 with twelve deaths, a rate of 7.84 per cent, and, excluding certain unfavorable cases, 5 per cent. The present mortality is about 6 per cent, and should not go over 10 per cent.

The oldest case of record is 70 years of age, the youngest 10.

My own case is as follows:

Sallie C., colored, married, aged 65, mother of five children. Family history practically negative. Her parents lived to middle age, her mother not being in good health, from cause unknown. The patient herself had always been in the best of health with the exception of her tumor. About the age of 25 she noticed a small lump about the size of the end of her thumb on the inner aspect of the right arm at the bend of the elbow, that remained for a number of years about as it first appeared, without

Author's case of interscapulothoracic amputation.

causing any inconvenience. No cause can be assigned for its occurrence. Five years ago it "arose and burst," as she describes it, and two more lumps appeared, one after the other. Since then they have been growing larger. Last fall they began growing quite rapidly and became cauliflower-like and very painful, the pain gradually increasing in severity.

She had long refused all efforts to induce her to have the arm removed, but at last was willing to be relieved in any way that seemed best, and was referred to me by her family physician.

S. P. A strongly built, well-nourished, but anemic woman. On the right arm on the inner and posterior aspect is an ulcerated, suppurating, cauliflower tumor-mass, divided into three separate bunches, extending from the middle of the arm to the middle of the forearm. The mass bleeds easily and has a typical odor. The hand and wrist are badly swollen, but above the tumor-mass the arm does not appear to be involved. One small axillary gland can be felt, the size of an almond.

A small piece was excised from the tumor and submitted to Dr. J. B. Nichols for examination; the pathological report being "Large round-cell sarcoma."

The interscapulothoracic amputation was decided upon because of the malignancy of the growth, and because it was deemed best to keep as far away as possible from the seat of disease in securing flaps.

TECHNIQUE OF OPERATION

The first incision was made from the acromion to the insertion of the sterno-mastoid muscle, and the periosteum of the clavicle with its muscular attachments was dissected off; the clavicle was next divided with a Gigli saw at the junction of the middle and inner third. After freeing it from all attachments it was grasped with heavy forceps and forcibly twisted back and removed from its union with the scapula. The subclavian artery and vein were next exposed by a careful dissection and separated. Two heavy silk ligatures were placed on the artery and tied, and the artery cut between them. An additional ligature was placed on the proximal end for safety, as the vessel seemed very friable. The arm was then elevated to allow it to empty itself, and the vein was tied and cut between ligatures. A second incision was now made from the acromial end of the first incision around the shoulder, across the axilla, and terminating at the lower angle of the scapula, and the tissues divided. The big nerve trunks of the brachial plexus were injected with a few drops of a one per cent solution of cocaine before division, after the method of Crile and Cushing, and divided at the point of injection, and the axillary gland and tissues were removed. A third incision was now carried from the junction of the first and second over the acromion, down over the dorsum of the scapula, and meeting the second at the lower angle. The scapula with its muscular attachments was quickly dissected out, bleeding points ligated, a hot compress stopped all oozing, and the wound was closed with interrupted silk-worm gut, with a rubber tissue drain in the lower angle. There was absolutely no shock, and no loss of blood, save a little remaining in the removed extremity, and the patient left the table in excellent condition. Time, one hour ten minutes.

The drain was removed on the third day, and recovery was uneventful up to the seventh day, the patient sitting up on the sixth. She was the life of the ward, laughed and joked with everybody, and kept the other patients in a continual state of good humor. On the seventh day she went into a profound stupor, at first not clearly understood, but soon recognized as due to cerebral embolism. On July 4th, the third day of stupor, the condition was much improved, she smiled and talked a little. On the 11th the conditions were much worse, face drawn, involuntary stools and urination; limbs responded slowly or not at all to irritation; she took nourishment, but could not talk. On the 12th the temperature suddenly rose to 108.6 and as quickly dropped again, showing that the heat centers were involved, as there was no corresponding rise in either pulse or respiration. She died July 15th, three weeks from day of operation.

The part of the operation requiring the greatest care was the ligating of the subclavian artery and vein before removing the arm and shoulder. One had to work cautiously and slowly; but with the clavicle out of the way, I was much impressed with the ease with which it was accomplished, and the

fact that the operation is much facilitated by the absence of diseased tissues in the region of the neck.

Death from this operation will be due to shock either accompanied by hemorrhage or without it, and therein lie the two important points to be observed: — the control of hemorrhage and the prevention of shock from division of the great nerve trunks. In my case it was very clearly shown that shock could be prevented by absolutely controlling hemorrhage so that practically no blood was lost, and by the adoption of the Crile-Cushing method of injecting a weak solution of cocaine into the large trunks of the brachial plexus before division. That the division of these large trunks — the brachial plexus, sciatic and anterior crural nerves — is one of the greatest factors in contributing to surgical shock, is almost too well known to require mention. Crile, who has done much work along this line both experimentally and in practical work, has shown that the injection of a few drops of a weak solution of cocaine directly into the nerve trunk before division completely eliminates this factor. Cushing has reported 2 cases of interscapulothoracic amputation, and Lund and Farrar Cobb each 1, in which this method was used with perfect success.

The control of hemorrhage is probably the most important factor, and the third portion of the subclavian artery and vein should be exposed by the method that promises the greatest safety. The method of resecting the clavicle at its inner third was chosen, because no good reason was seen for adopting the more dangerous one of disarticulation at the sternal joint, in which one would risk wounding the innominate vein or the pleura; while, had the operation been on the left side, there would have been, in addition, danger to the thoracic duct at its junction with the subclavian and internal jugular.

The operation as detailed is essentially that perfected by Berger and published in 1887.

REPORT OF A CASE OF DEGENERATED UTERINE MYOMA[1]

By E. A. VANDER VEER, M. D.
Attending Surgeon, Albany Hospital

I wish to report the following case, the particular point of interest being the pathological findings.

The history of the patient is as follows:

Mrs. J. E. Born in United States. Age, 53; married. Housewife by occupation. Entered the Albany Hospital complaining of a growth in the lower part of the abdomen.

Family History. Maternal grandmother died of cancer of the stomach. No history of tuberculosis in the family. Family history otherwise negative.

Past History. Was sick at the menopause, dropsy setting in at that time, and legs and feet were badly swollen, but have not been swollen for three years.

Present Illness. Four years ago began to notice that abdomen was enlarging. The growth has been steady and gradual up to the present time. She has some pain low down in the abdomen, which patient attributes to weight of tumor. The inconvenience and unsightliness of it are the principal complaint of the patient.

Habits. Appetite good. Bowels very constipated. Sleeps well. Menstruation ceased three years ago and has never flowed since. Two children alive, one 29, other 22. Miscarriage 14 years ago, 4 months along.

Unfortunately the patient was not measured around the waist before the operation. The photograph, however, gives a good idea of her size. On physical examination the abdomen presents a tumor mass of twice the size of a four months pregnancy. Tumor fluctuates. Tympanitis in flanks.

On incision of abdomen, a thick-walled cyst presented itself without any adhesions. Trochar introduced and 18 pounds of fluid removed, one cyst not being opened. After this fluid had been removed, it was seen that the rest of the tumor was composed of myoma of the uterus. A supra-pubic hysterectomy, with appendages, was then done. Patient lost but little blood. The appendix, very small, was not removed. The wound closed with silkworm-gut sutures. She left the table in good condition, rallied well from the operation, and made a good recovery.

The most interesting part of the case, which is the pathological report, is as follows:

Albany Hospital. Service of Dr. E. A. Vander Veer. Aged 53.

[1] Read before the Southern Surgical and Gynecological Association, New Orleans, December 17, 1907

Fig. 1. Mrs. E. Cystic fibroma of the uterus. Fluid 18 pounds. Tumor 8 pounds.

Clinical Diagnosis. Ovarian cyst.

Organ or Tissue. Uterus, tubes, and ovaries.

Remarks. Has had four children, two were twins, two of the four still living. Had a miscarriage 14 years ago. At 41, began having uterine trouble and during this period experienced alternate periods of good health and great debility, and sometimes the slightest move would cause the blood to come in streams — would pass clots as large as one's hand. About 6 years ago, for a period of 3 months, flowed violently, though discharge had hardly any color, just a yellowish cast. Began to enlarge 4 years ago, the enlargement during past year being particularly rapid. For past 3 years has not flowed except a slight bloody discoloration to discharge occasionally.

Specimen consists of a uterus and appendages, the uterus having been removed by supra-pubic hysterectomy. The peritoneum covering the body and about the appendages has numerous firm fibrous tags attached, the left tube and ovary being intimately adherent. The appendages are elongated but otherwise apparently normal. Below the origin of the right tube is an incised wound, measuring 3 cm. in length, from which at operation was removed 18 pounds of a dirty brownish fluid, in which were numerous pieces of brown friable material, resembling blood clot. The uterus measures 28.5 x 28 x 8 cm. It is soft and flabby, and has been sectioned posteriorly. This incision opens into a larger cavity, the wall of which measures 3 cm. in thickness and the individual fibres of which are visible and distinct. This cavity is smooth, except over the anterior wall where it is thrown into numerous folds, and in part is irregular, due to a fluctuating mass about the size of an orange. The lining surface is covered by a smooth, glistening, dark brown membrane, which at the border of the corrugated area presents a reduplication. Distributed through it are yellow areas, containing cholesterin crystals. On section the mass is found to be made up of a series of cavities, filled with a yellow serous fluid. Between these cavities the supporting framework is composed of dense, yellow, fibrous tissue. To the right and posteriorly of the large cavity is a smaller cavity, which will admit an adult hand. This cavity extends toward the origin of the right tube and is of irregular outline. The lining surface is pinkish gray, and covered by a yellow sand-like material. Between the origin of the ovarian ligament and Fallopian tube is a fluctuating mass, measuring

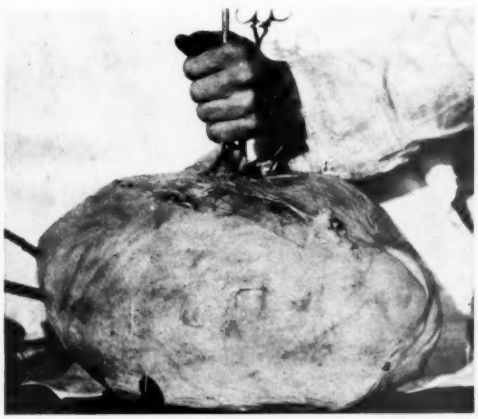

Fig. 2. Tumor unopened.

Fig. 3. Photograph of tumor after escape of fluid.

4.5 x 2.5 x 3 cm., which on section is found to be made up of a series of cavities which are filled with a pale, yellowish brown, gelatinous material, about which the tissue is soft and grayish yellow and friable.

Anatomical Diagnosis. Chronic pelvic peritonitis. Multiple fibro-myomata of uterus with cystic transformation.

Microscopic Description. 1. Small cavity. The lining surface is covered by a layer of necrotic material. Beneath it there is a marked proliferation of young connective tissue, with fibrous transformation. Occasional plasma cells and polynuclears are present. The blood vessels are engorged and dilated. The intra-muscular connective tissue contains numerous areas of small round epithelial cells.

2. Large cavity. The lining surface is composed of edematous connective tissue, the superficial portion of which is composed of small round and epithelioid cells, between which is very little intercellular substance. The deeper portion is less cellular, containing considerable fibrillar intercellular substance. In the tissue beneath the lining surface is a small amount of old blood pigment. The intra-muscular connective tissue is irregularly increased and many of the blood-vessels are thickened.

3. Subperitoneal tumor. Irregular edema is present throughout; also area of necrosis. The greater part is composed of densely packed cells, having no definite outline or arrangement. The nuclei are of regular size and shape. Within the cellular tissue are a few areas of smooth muscle, showing hyaline degeneration. Adjacent to the cellular tissue, and extending into it, is considerable fibrous tissue in which are a few bundles of smooth muscle. A small portion of peritoneum is present.

Microscopic Diagnosis. Multiple myomata of uterus. Cyst of uterus resulting from degeneration of large myoma. Compression and obliteration of uterine cavity, with degeneration and destruction of mucosa.

STAB WOUND OF FETUS IN UTERO

Report of a Case of Stab Wound of Fetus in Utero, at Six and One-half Months, Penetrating Lateral Aspect of Abdominal Wall of Left Side, Completely Severing Jejunum. Escape of Large and Small Intestines Through Wound. Fetus Delivered at Term. Normal in All Other Respects. Operation. Autopsy

By D. A. K. STEELE, M. D., LL.D., Chicago
Senior Professor Surgery College of Physicians and Surgeons.

Mr. President and Members of the Chicago Surgical Society:

The history of the case that I will present for your consideration to-night, and the specimen submitted for examination, seem to be unique in the annals of surgical literature, and merit preservation in the archives of our society.

The following is the history:

September 15, 1907, Mrs. Mary M., aged 19, married three years, mother of one child, aged 22 months, in a fit of anger stabbed herself with a knife in the right side of the abdomen, four inches to the right and one and one-half inches below the umbilicus. At this date she was six and one-half months pregnant. She was taken to St. Elizabeth's Hospital and treated for one week, when the wound in her abdominal wall healed, and she returned home and has enjoyed good health since. She states that the surgeons at the hospital told her that the stab wound had probably not penetrated the uterus.

November 28, at 2 P.M., she was delivered by a midwife of a live male child, normal and fully developed, with the exception that, protruding from a wound in the lateral aspect of the abdominal wall of the left side, one and one-half inches above the anterior superior spinus process of the ileum, was a mass the size of a closed fist, which, on examination, was found to be the intestines. Dr. C. E. Brinkerhoff was called at 6 P.M., and notified me of the condition present. At my request the protruding bowels were wrapped in warm antiseptic gauze, the child enveloped in warm blankets, and was brought immediately to the Woman's Hospital for operation.

On examination a partially healed incised

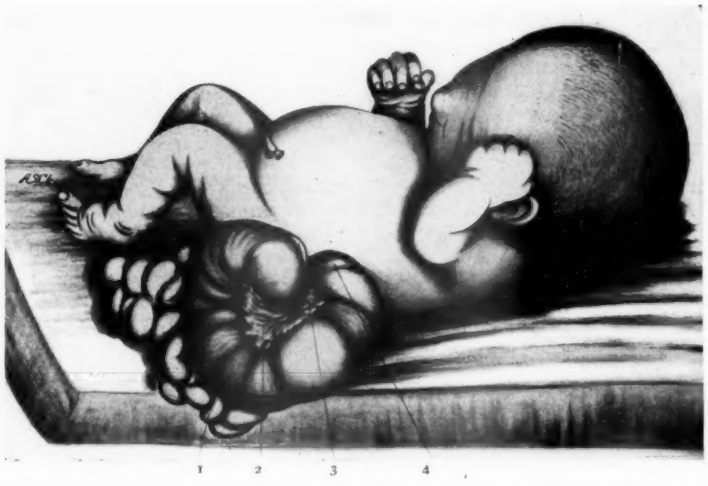

Fig. 1.

1. Ileum. 2. Mesentary. 3. Distal blind pouch and contracted jejunum. 4. Proximal end of jejunum.

wound, one inch in length, at the point indicated, was demonstrated. Protruding through this wound, adherent to its margins, was the jejunum, the ileum, and all of the colon down to the sigmoid flexure. The upper portion of the jejunum was enormously dilated, being one and one-half inches in diameter. The lower portion of the jejunum, all of the ileum, and colon were coiled up in the adherent, contracted mass, the diameter of the ileum and colon being about one-eighth to one-fourth of an inch.

Maconium was found in the rectum. Many firm adhesions were found around the margins of the wound, which entirely closed the peritoneal cavity. A transverse incision across the abdominal wall, toward the median line from the stab wound, was carefully made, and the abdominal cavity entered with difficulty. It was found empty, except for the liver, spleen, pancreas and stomach, about four inches of duodenum, and two inches of the sigmoid flexure of the descending colon and rectum. All the rest of the gastro-intestinal tract lay outside the body, protruding through the stab wound — as shown in the photograph and drawings. The whole mass of intestines was agglutinated in folds of the mesentery and omentum, and a plastic exudate, which at first rendered the anatomical outline of the mass somewhat obscure.

Beginning at the pyloric end of the stomach, the duodenum and upper portion of the jejunum were separated, and traced down to a blunt extremity of the greatly dilated jejunum, about six inches below its juncture with the duodenum. The stomach contained about two and one-half ounces of bloody, viscid fluid, which was removed by catheterizing the œsophagus. A soft catheter introduced into the rectum, failed to pass through the mass of meconium, and met with obstruction after being introduced about one and one-half inches. Numerous adhesions, omental and fibrinous in character, were separated, the irregularities of the small intestines and colon were teased out as far as possible, and elevating the child by the heels and widely separating the edges of the wound, the entire mass was carefully restored to the abdominal cavity, the cavity filled with a warm normal salt solution, and the operation wound closed. No attempt at entero-anastomosis was made. The contracted, tortuous condition of the jejunum, ileum, and colon, had practically destroyed the patency of the lumen of the bowel, and rendered anastomosis impracticable. On account of the dense mass of adhesions around the divided bowel wall, I was unable, at this time, to recognize the fact that complete severance of the jejunum had occurred by the stab wound, and as the condition of the infant was so critical, and the result of any further operative intervention hopeless, nothing further was attempted.

The child reacted well, and survived the operation eight hours. Post mortem examination was made the next morning, at which time all the abdominal contents were removed. A further demonstration of the intestinal lesion showed that

the jejunum had been completely cut across by the stab wound penetrating the right abdominal wall of the mother, the right wall of the gravid uterus, and the left abdominal wall of the fetus in utero, completely severing the jejunum about six inches below its juncture with the duodenum.

The extraordinary feature of this case lies in the fact that a stab wound through the abdominal walls of the mother, penetrating the gravid uterus, entering the abdomen of the fetus in utero, completely severing the jejunum, and permitting the escape of the large and small intestines through the wound of the abdominal wall of the fetus — should not in any way have interfered with the growth and development of the fetus in utero, nor seriously affected the recovery of the mother.

Another interesting fact is the complete occlusion of the two divided ends of the intestine of the fetus, and the presence of nearly three ounces of glairy, sanguinoloid fluid in the stomach of the fetus at the time of operation — ten hours after birth. Unfortunately, this fluid was not preserved, so that I am unable to present a chemical analysis

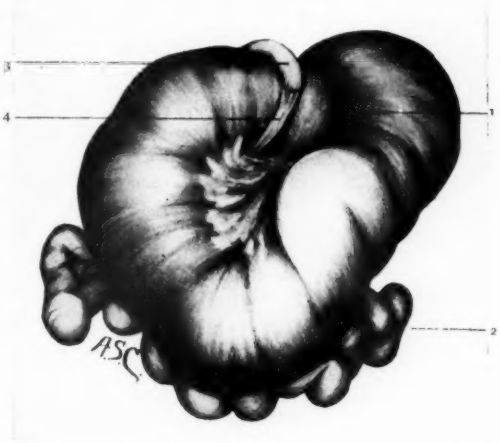

Fig. 3. Posterior view of intestine, showing blind pouch.
1. Proximal blind pouch of distended jejunum.
2. Contracted tortuous colon and small intestine.
3. Distal blind pouch, contracted jejunum.
4. Fibrous adhesions and plastic exudate.

Fig. 2.
1. Distal blind pouch and contracted jejunum.
2. Proximal blind pouch and distended jejunum.
3. Fibrous adhesions and plastic exudate.
4. Distended duodenum and upper part of jejunum.
5. Contracted ascending colon.
6. Contracted tortuous colon and small intestine.
7. Vermiform appendix.

of the fluid, or to throw any light on the problem discussed by our obstetrical friends, as to the nourishment of the fetus in utero by determining whether or not the fluid in the stomach was identical in its constituents with amniotic fluid.

In looking up the literature of the subject for me, my friend, Dr. William Fuller, finds a case reported by Beattie in the British Medical Journal, 1879, vol. i, page 1701, which in some respects resembles my case, although there was no reference to any injury or accident to the mother, and no autopsy was held to determine the cause of death. (Beattie reported the birth of a well developed child at term. The mother was a primipara, and the labor was in every way normal.)

"One and one-half inches below the umbilicus, and a little to the right of the median line, was a small opening in the abdominal wall of the child, which had permitted the escape of the whole of the colon and practically all of the small intestines, which were tightly constricted and presented a very contracted appearance. The opening was enlarged, the intestines replaced, and the wound was closed with silver wire sutures. The child reacted promptly from the operation, but died in thirty hours."

My friend, Dr. H. M. Richter, at my request, looked through the Index Catalogue, to ascertain if there were any similar cases recorded, and reports to me that Finnell reported a case of wound

of fetus in utero in the Buffalo Medical Journal, 1859, vol. xvi, page 475. Hoyt reported a case of wound in utero in the Boston Medical and Surgical Journal, 1844, vol. xxx, page 241; and Jones reported an extraordinary case of lesion within the uterus, with a partial reparation before birth, in the Medical and Chirurgical Transactions, London, 1847, vol. xxxii, pages 59-63. None of these cases in any way resembles the one reported to-night. And in addition to these references, a large number of papers on the general subject of intra-uterine injuries have been carefully investigated — references being made to the ordinary injuries from bands, etc.; so, from a careful inspection of the literature, the rarity of this case seems to be fully established.

I herewith present the post mortem specimen, and call your special attention to the enormous dilatation of the duodenum and upper few inches of the jejunum, the dilated portion terminating in a blind, blunt end of the jejunum, showing beautifully how nature had completely occluded the divided small intestine by a plastic exudate, which became completely organized.

You will observe, also, that the upper end of the contracted, tortuous jejunum, ileum, and colon is only from one-eighth to one-fourth of an inch in diameter, and the blunt end of the distal extremity is completely occluded in a similar manner, and lies obliquely across the distended proximal end, adherent by fibrinous exudate, but the continuity of the bowel completely destroyed at this point.

It is interesting to observe also that the proximal portion of the occluded bowel apparently has developed enormously, and contained some gastro-intestinal fluids, while the distal end became atrophic, convoluted, and shrunken, on account of the absence of any function; while the rectum and lower two inches of the sigmoid flexure, which remained within the child's abdomen, presented a more normal appearance, the rectum containing meconium, normal in appearance, but deficient in quantity. I direct your attention particularly to the appearance of the bowel above and below the point of division, because it is analogous to what we find when a nerve trunk or tendon is severed by an accidental wound, the proximal portion of these structures remaining normal, while the distal portion atrophies in a very marked degree within a few weeks, if nerve or tendon suture is not done.

In cases of arrested development of the gastro-intestinal tube, or in congenital absence of a portion of the intestine, we always find the lumen of the proximal and distal ends of the intestine of about the same diameter.

OVARIAN HERNIA, WITH A REPORT OF A CASE[1]

By RICHARD A. BOLT, A.B., M.D.
House Gynecologist, St. Vincent's Charity Hospital, Cleveland, Ohio

The comparative infrequency of hernia of the ovary makes the following case of more than usual interest. In a large and varied experience Howard Kelly has seen but two such cases, both of which were associated with congenital malformations.[1] Halsted, out of 27 cases of hernia in women, has come across but 2 in which the tube and ovary were involved in the hernial sac. Englisch, out of 38 collected cases of ovarian hernia, found that 27 were inguinal, 9 femoral, and 1 an obturator and ischiatic hernia.[2] Enterocele was found with 27 of a series of 67 cases, observed by Langton, mostly in children.[3] The literature on this subject has recently been reviewed by Dr. J. H. Carstens of Detroit, who found 117 reported cases, including two very interesting ones added by himself.[4] From the standpoint of diagnosis and uniqueness of treatment the following case merits some attention.

1. Operative Gynecology, by Howard A. Kelly. Vol. ii, p. 599.
2. Ibid. Vol. ii, p. 590.
3. Ibid. Vol. ii, p. 601.

CASE. Mrs. K. B., aged 35 years. Nationality American. Married 14 years. Occupation, housework. Admitted to Charity Hospital September 25, 1907, with a provisional diagnosis of left inguinal hernia (ovarian). Patient has had 5 children. All are living in fair health. One miscarriage two years ago. Labors all difficult, the last delivery being with instruments. Perineum and cervix torn with first child. These were repaired four years ago.

Personal History. Patient complained of dragging pains in the small of the back, headaches, tired feeling, crampy-burning pain in the lower abdomen, and pain and swelling in the left groin. She has never been very strong.

One year ago patient noticed for the first time a small swelling in her left groin. This could be easily replaced, but came down again when patient was on feet working.

4. Jour. A. M. A., Nov. 2, 1907, p. 1,512.

[1] A preliminary verbal report of this case was given by Dr. W. H. Humiston before the Cleveland Academy of Medicine at a meeting of the Clinical and Pathological Section, October 4, 1907.

"By spells" the tumor would seem to grow larger and then subside. Sometimes at the menstrual period it would be slightly larger and more painful. Very little trouble in reducing the hernia until lately. When difficult to replace, the patient claims she experienced "burning, sickening pains" which extended up from the left groin, and then across the abdomen to the other side.

Menstrual History. Menses began at 14 years. Never very regular. Flows 4 to 7 days. Pain and cramps at the first part of periods. Small clots passed at times. Last period August 20, 1907. Very slight leucorrheal discharge occasionally.

Present Condition. The patient was first seen in the Dispensary of Charity Hospital, September 21, 1907. She then complained of pain in the small of the back and across lower abdomen. This pain was described as "a burning, crampy pain," and seemed to be increased on pressure.

Vaginal examination revealed the following: The perineum was slightly relaxed, showing the scar of an old repaired laceration. Cervix of moderated size in the axis of the vagina. Old repaired bilateral laceration of cervix. Uterus firm, in normal anteflexion, and moderately movable. Ovary on the right side easily palpated, and apparently normal. Parametra on that side normal. On careful palpation over the left side no ovary could be felt; but when the external hand was placed in the left inguinal region the woman complained of pain. Examination there revealed a tumor about the size of a pigeon's egg, just above Poupart's ligament. It was slightly irregular, and had a firm, elastic feel. On coughing no expansile impulse could be obtained. With the left thigh flexed, the tumor could be rather easily reduced by gentle manipulation. The patient complained, however, of some sickening pain. The external abdominal ring readily admitted the tip of the index finger. When the patient strained, or coughed, while in the recumbent posture, the hernia did not easily come down. It reappeared, however, with such efforts, when the patient was upon her feet. A provisional diagnosis of inguinal ovarian hernia was given and the patient referred to Dr. W. H. Humiston. He carefully examined the woman and found practically the same points as noted before with the exception that he detected an ovoid body well out to the left side, and somewhat posterior to the uterus *when the hernia was reduced.* This, Dr. Humiston thought, was a slightly enlarged, prolapsed left ovary. The woman up to this time had never worn a truss as her family physician had said that it would be too uncomfortable, and do no good. It was not thought necessary to fit one at this time. The hernia was, therefore, reduced and the woman told to return for operation September 28th.

The woman claims that at 4 o'clock on the morning of September 25th, while straining at stool, a larger and firmer tumor appeared in the left groin than had ever been there before. It was firm and quite sensitive to the touch, especially at its lower end. The pain increased steadily, and was of a sickening, crampy nature when the woman attempted to replace the hernia. All efforts of patient and friends failed to reduce the hernia, and she was sent immediately to the hospital. It should be noted that the woman began to menstruate the same morning and continued to flow for 5 days after entering the hospital.

When seen shortly after noon September 25th, the patient complained of great pain in the left groin. On manipulating the hernia in an effort to reduce it, the pain seemed to be excruciating. An ovoid tumor, about the size of a large lemon, was seen in the left groin above Poupart's ligament. It was quite firm and slightly irregular at its lower pole; more elastic and fluxuating near the external abdominal ring. Several attempts were made to reduce the hernia, the patient crying all the while with pain. Finally the upper part suddenly slipped back with a gurgling sensation as though a tense bag of water had ruptured. After this was replaced, the firmer ovoid mass below it was easily reduced. A firm pad and bandage were then applied, the foot of the bed raised, and morphia gr. ½ hypo. ordered. After this the woman became fairly comfortable. She took light nourishment. Had a little desire to vomit. Bowels were thoroughly moved in two days. Patient was in fair condition for operation on October 2nd.

Operation by Dr. W. H. Humiston. Ether anæsthesia. Trendelenburg position. An incision about 2 inches long was made at the outer border of the left rectus muscle. On opening the abdomen an excellent view of the pelvic viscera was obtained. The uterus was seen to be in anteflexion and slightly bent towards the left side. The left broad ligament was relaxed, and the appendages freely movable. The left ovary was sclero-cystic and in proximity to it was a parovarian cyst about the size of a small lemon. The fimbriated extremity of the tube together with ovary and parovarian cyst could easily be displaced into the internal inguinal ring. These structures had undoubtedly made up the contents of the hernial sac. The right tube and ovary were apparently normal. Appendix not inflamed. The intestines and omentum were entirely free, and showed no adhesions in the neighborhood of the left iliac fossa. On retracting the abdominal wall to the left, the left internal inguinal ring was easily seen with the peritoneal hernial sac puckered up about its edges. The index finger could readily be inserted into the inguinal canal.

The left tube and ovary, together with the parovarian cyst, were ligated off, and removed in the usual manner. With a very small round needle carrying fine silk thread, the edges of the internal inguinal ring were carefully drawn together *from within* by means of a continuous stitch. The abdomen was then closed with interrupted silkworm-gut sutures, the sutures being placed from within outwards, and catching a small portion of peritoneum, muscle, fascia, and skin. The edges of the skin were accurately approximated. A firm pad was applied over the external abdominal ring, and the ordinary dressings over the wound.

The woman made an uneventful recovery, and was up in about three weeks. The abdominal wound healed perfectly. No recurrence of the hernia. The woman returned a month after leaving the hospital, with an exacerbation of her old pulmonary trouble; but with no signs of hernia and no discomfort in the abdomen or pelvis.

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SOME REMARKS ON THE INTRAGLANDULAR ENUCLEATION OF GOITRE[1]

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IN the report on the surgical treatment of goitre that I was deputed to make to the twelfth session of the French Congress of Surgery in 1898, I showed the superiority of intraglandular enucleation, viewed either from the standpoint of mortality, or that of immediate or remote complications and, further, as to the cosmetic result.

I again take up this subject, for, on the one hand, some surgeons, most competent in the matter of goitre, consider partial thyroidectomy as the ideal operation, which does not seem to me to be justified; and, on the other hand, the new ideas that we owe to the physiologists on the functions of the thyroid and parathyroid glands furnish me with new arguments in favor of enucleation.

It was Porta, as we know, who first practiced, and that in 1840, intraglandular enucleation of tumors of the thyroid. This method was employed in some cases by Billroth, Wolff, and Bruns. In 1880, I myself enucleated solid tumors in two cases, deliberately planning the first, while in the second, having planned a unilateral thyroidectomy, and the tumor having been removed without ligation of the thyroid arteries, I perforce recognized that the ablation had been within the capsule of the gland.

The operation of Porta was adopted by many surgeons (Kottmann, Burckhardt) as the operation of choice for cysts, but to Socin of Basel belongs the merit of having recommended intraglandular enucleation for solid tumors, of having shown its advantages, studied its technic and, finally, of having demonstrated that it is practicable in a large proportion of cases of goitre.

To make plain the superiority of intraglandular enucleation over other operative methods and the reasons for this superiority, some words on the pathologic anatomy are indispensable; it is necessary also to be thoroughly clear as to the technic of the operation.

A very large proportion of goitres, at least in our country, are due to the development, at varying depths in the thickness of the gland, of single or multiple adenomata. We know that these neoplasms may develop in differ-

[1] Translated by Charles Adams, M. D., of Chicago.

ent ways, that they may continue growing as solid tumors preserving their benignant nature, may undergo transformation into malignant tumors (malignant adenomata or epitheliomata), or end in the form of liquid cysts.

The benign tumors, solid or liquid, are, it is hardly necessary to say, those only which are amenable to operation by enucleation; and what follows concerns them alone. These tumors in their growth present the peculiarity of isolating themselves from the neighboring tissues, and present the characteristics of what were formerly designated by the term "encysted tumors;" their mass, more or less voluminous, is clearly limited by a fibrous layer, sometimes, it is true, very thin, and separated from the adjacent parts by a layer of delicate cellular tissue which carries its nutrient vessels. In the case of a liquid cyst, the membrane has need of very little blood for its maintenance and receives few vessels from the surrounding parts; when, on the contrary, the adenoma remains solid, it requires a greater blood supply, and numerous arterioles enter it on its periphery.

So long as the tumor retains the characteristics of a benign neoplasm, be it cystic or solid, it remains clearly defined, distinct from the neighboring tissues and connected with them by a more or less dense, commonly quite delicate cellular tissue, easy to separate and carrying the blood-vessels. In short, it is encysted and more or less easily enucleable.

When multiple adenomata have originated in the same thyroid, although they increase in size, they always remain distinct and separated by a more or less thick layer of healthy glandular tissue, or they may lie close to each other and, in a way, touch, but they never fuse; they are always separated by a little connective tissue with their blood-vessels. It is not rare, in such cases, to find in groups or bunches little ovoid adenomata of the size of peas or small cherries that may be successively enucleated as one picks single grapes from a bunch. Frequently these little tumors are in proximity to a more voluminous one which has taken to itself most of the nutrient blood supply, not leaving sufficient for its little brothers, so that the enucleation of these small adenomata is often made with small loss of blood.

The size of encysted tumors of the thyroid is very variable. The largest are generally liquid, and such have been observed of the size of a head. Solid tumors rarely attain such dimensions, and most often, whether single or multiple, the whole mass will seldom exceed the size of an egg or that of a fist. Whether developing within the limits of the normal gland, in its prolongations or in accessory thyroids, a goodly number of retrosternal, retrovisceral and endothoracic goitres are adenomata.

In their gradual development thyroid adenomata tend more and more toward the anterior surface of the gland. This is easily understood, for posteriorly their extension is opposed by the trachea, œsophagus and spinal column. In general, they project laterally or anteriorly. When they become somewhat large, the peripheral parts of the gland become thinned, the compression exerted on them by the neoplasm interfering with their nutrition. As a re-

sult, the knife with which the capsule is incised comes quickly upon the adenoma.

In most cases the cellular tissue which unites the adenoma with its shell of gland tissue is delicate and easy to break up, the resistance of its vessels yielding readily to the finger. This holds good only in the absence of previous treatment, and not if some intervention have preceded the enucleation. Punctures, with or without injections in cystic tumors, or parenchymatous injections in solid growths, result in thickening and fibrous transformation of the capsule and its more or less intimate fusion with the tumor. Enucleation will then be in any case difficult and often impossible. In order that enucleation may be accomplished without hindrance, it is essential that the tumor shall not be torn, and it should be understood that inflammatory modifications and the adhesion of the tumor to the gland favor the occurrence of this accident.

This being established, what should be the technic of the operation of intraglandular enucleation?

The incision of choice is that of Kocher (Kragenschnitt), transverse and curved, with the convexity downward. It is, without doubt, that which leaves the most perfect cosmetic result; but we must be eclectic, and if the tumor be high in the gland, or very large, inasmuch as, in my opinion, the gland itself should not be luxated, this incision will be insufficient and we should use the oblique rectilinear or curved vertical incision, or, as the operation proceeds, we may extend one of the extremities of the Kragenschnitt upward. Safety should never be sacrificed for cosmetic results. Further, enucleation, for the reason that it does not involve luxation, does not require extensive exposure of the gland. The skin and the platysma being incised, the fascia in turn is divided vertically, as nearly as possible in the median line. Accordingly as the tumor projects in the median line or laterally, the muscles may be simply retracted or vertically incised, also as nearly as possible in the median line.

The cellular tissue still covering the gland should be completely divided, but with extreme precaution, as we perceive under this layer the vessels which run over the surface of the gland and may be easily torn. When the gland is well exposed, to an extent ordinarily of 3 to 4 centimeters, the operator seeks a space unoccupied by large vessels and incises the thyroid substance vertically, layer by layer, until the surface of the tumor is reached. Naturally, more or less severe hemorrhage is produced, but the gland once incised, it is easy to efficiently seize the vessels, compressing with them the glandular tissue, either after the incision has been made or during its progress, if that be necessary.

How do we know that the adenoma is exposed? Primarily by the difference in color, then by the fact that the neoplasm is separated from the enveloping gland structure by a layer of delicate connective tissue forming a plane of cleavage, and because the surface of the tumor is smooth and distinct from the thyroid tissue. As soon as the thyroid shell has been incised throughout its thickness, the edges of the incision with the divided vessels should be

seized with artery forceps. These effect hemostasis and will later serve as a guide for suturing.

We now proceed to the enucleation, which may be made with the director of Kocher or with the finger. For my part I prefer the finger, with which, even if gloved, one can feel perfectly what he is doing. The index finger is insinuated in the plane of cleavage and separates the tumor from its envelope, making its way little by little in the cellular interstice until the separation is complete and the adenoma is lifted from its bed.

As I have elsewhere said, I believe that it is ordinarily preferable to proceed in this operation in a rather leisurely manner, because by so doing the vessels which come from the thyroid envelope are stretched before being broken and the hemorrhage is therefore less; but it is needless to say that if, in spite of the precautions taken, hemorrhage is too profuse, one changes tactics and rapidly, but always prudently, terminates the enucleation in order to effect hemostasis.

There is besides a detail of technic which to me seems of great importance, the employment of which diminishes hemorrhage and greatly facilitates terminal hemostasis, *i. e.*, as the finger penetrates and separates the adhesions, the bleeding surfaces of the thyroid as they are freed, are successively seized with hemostatic forceps and drawn forward. At the moment that the tumor is lifted from its bed, the posterior wall of the cavity is seized with forceps and turned outward so that the whole of the internal surface is exposed to the view of the operator; this procedure makes hemostasis much more easy. The visible bleeding points being secured, the cavity, with forceps still in position, is packed with gauze, the opening closed, and compression being maintained for some minutes, the parenchymatous hemorrhage is thereby arrested or moderated. The tampon is then removed, and vessels still bleeding are seized in turn. The next step is the application of ligatures. This latter accomplished, a drain is placed in the cavity and the latter sutured. If it be small, it suffices to unite its edges; but if large, it should be obliterated by bringing its surfaces together by buried sutures of catgut. The muscles and fasciæ should also be sutured with catgut, and the skin reunited with silk-worm gut or the Michel clasps. The drain emerges through the line of sutures or through a counter-opening according to the requirements of the case.

In concluding this rather minute description I insist on the following points: In the first place, on the uselessness and danger of the luxation of the thyroid. It is useless, because it suffices to expose thoroughly a few centimeters of the gland for incision, and it is dangerous in needlessly aggravating traumatism and in exposing neighboring organs, particularly vessels and nerves, to lesions when accomplished with some difficulty. In the second place, I insist on relative slowness of operation, preferable in my opinion, during enucleation properly so called, and finally on the utility of placing forceps on the thyroid envelope successively during the progress of separation of the neoplasm.

If instead of a single adenoma we have to deal with a tumor made up of a greater or less number of nodules, the operation may present many variations.

Let us suppose, and such cases are not rare, that at the side of an adenoma of medium size there are many others as large as cherries or peas, it will often be possible to remove them through the primary incision if they are in contact, or by incising the internal surface of the thyroid tissue when they project, if they are simply neighbors. In other cases, after the enucleation of one tumor, it may be necessary to remove one or many through different incisions of the overlying gland. Cases have been observed in which as many as sixteen adenomata have been removed in this fashion from the same goitre. The very small adenomata scattered around a principal large tumor can be enucleated with the greatest ease and without any hemorrhage.

To avoid recurrence, it is always of prime importance to determine by close examination that no nodule be left behind. The operation will be somewhat prolonged, but its danger will not thereby be increased.

Let us now on the one hand consider the real or supposed disadvantages of enucleation, and on the other its advantages.

The two objections made to this method are: the loss of blood which it would occasion, and the greater frequency of recurrence to which the patient would be exposed. Have these objections any foundation, and to what extent?

HEMORRHAGE.

It is certain that extirpation, so perfectly methodized by Kocher, in whose operation the vessels are seized and ligated before being divided, is in experienced hands accompanied by very little bleeding; and on the other hand, enucleation, however well done, must perforce give rise to a loss of blood of which the amount depends more on the vascularity of the tumor than on the expertness of the operator, *i. e.*, the hemorrhage which takes place during the enucleation proper. It is needless to exaggerate the importance of this loss of blood. If we consult the figures of Bergeat, pupil of von Bruns, on the loss of blood during the enucleations and thyroidectomies of his master, we see that for enucleations he counts 71 per cent of the hemorrhages as insignificant, 20 per cent as notable, 7.4 per cent as profuse and 2.25 per cent as very profuse, and for the thyroidectomies respectively 78 per cent, 15.6 per cent, 4.2 per cent and 2.1 per cent. The difference is very slight and unimportant in that the very profuse or dangerous hemorrhages occur only in a slightly increased proportion (2.25 per cent to 2.1 per cent).

Some surgeons have endeavored to lessen the danger of hemorrhage during enucleation, by preventive hemostasis, by ligature of the base of the luxated thyroid with an elastic tube (Bose), by temporary compression of the arteries (Niehans), or by deligation (Roux). These procedures seem to me to have disadvantages which outweigh their single advantage, which is to save loss of blood. They do away with the primordial benefits of the operation of enucleation which are: to avoid all injury to the neighboring tissues and to con-

serve the vitality of the glandular covering. It seems to me that the latter would be compromised in grave fashion either by the elastic compression of the tumor, or by the constriction of the arteries by forceps or ligature. Furthermore, the procedure of Bose necessitates the luxation of the gland, which should be avoided as much as possible with the view of limiting the extent of the trauma.

Those tumors, however, enucleation of which might be dangerous on account of hemorrhage and which are not amenable to this operative method; those which are exceedingly vascular, those, in particular, which are pulsatile, should be removed by thyroidectomy, and on this point I maintain my conclusions of 1898: "It will be well to take into account the danger of hemorrhage and to prefer extirpation in very vascular tumors when this peculiarity can be recognized beforehand, or to change an enucleation already begun to another procedure, if one gets into difficulties with too much hemorrhage."

Again, it has been charged that enucleation is followed by secondary hemorrhages and the formation of hematomata which retard healing. One cannot see that enucleation should be more likely to be followed by secondary hemorrhages, which are due to faulty application of ligatures or to infection, than another method, and if secondary hemorrhages occur, the lack of care or expertness on the part of the operator should be blamed and not the method.

What is meant, I think, by the "alleged" hematomata, is the accumulation of blood in the cavity left in the gland by the continuation of an imperfectly arrested parenchymatous hemorrhage. As a matter of fact, one finds quite frequently at the first dressing a notable tumefaction of the region of the operation. This, I believe, is due in large measure to swelling of the thyroid tissue, but there is certainly sometimes added a collection or infiltration of blood which gives rise to the appearance, at the base of the neck, of an ecchymosis which may extend to the upper part of the chest.

But even in such cases I have not observed any serious trouble as a result of this condition, and the febrile reaction is of an aseptic character and is probably due to the simultaneous absorption of blood and the thyroid secretion.

I do not deny the occurrence, in certain cases, of these hematomata, but I do not consider this accident as in any way serious enough to influence the choice of operation.

RECURRENCE.

A more serious objection is that of danger of recurrence. It is not to be doubted that, in spite of all care, recurrences will be more frequent after enucleation than after thyroidectomy, all the more in that they may appear in both lobes, in the side operated on as well as in the other. Kocher and Brunner both affirm this greater frequency after their enucleations. These recurrences are of no importance except in those cases, the only ones examined, I think, wherein a second intervention became necessary. I cannot decide as

to their real frequency, as my experience is not sufficiently large to do so with authority. But supposing their number to be notably larger than that of recurrences after thyroidectomy, which also occur according to the same authors, I ask if the condition of the patient is not less disquieting after enucleation than after thyroidectomy.

The patient after enucleation may have a recurrence in the lobe operated upon or in the other. In the first case it will be possible without danger to enucleate the recurrent tumor or even to remove the lobe. In the other case the outlook is the same, enucleation or extirpation may be done without danger of thyroid insufficiency. The patient after thyroidectomy is not in the same condition, he has but one lobe and that is the seat of the tumor; we cannot remove it without grave danger, and shall be forced to enucleation or to resection, and the latter under conditions perhaps already dangerous. If we resect, we must be sure to leave enough of thyroid tissue, and what is left must be competent.

The danger of recurrence in the lobe not operated on seems to me the strongest argument against thyroidectomy when enucleation is possible. Enucleation provides for, while thyroidectomy may compromise, the future.

ADVANTAGES OF ENUCLEATION.

The advantages of enucleation correctly carried out in the cases to which it is suited are as follows:

1. Intraglandular enucleation shields from all lesions the neighboring organs, particularly the recurrent nerves.
2. It does not expose these organs to secondary lesions due to the process of cicatrization.
3. It preserves all normal gland tissue and assures, so far as possible, the continuance of function.
4. It should avoid suppression of the parathyroid glandules.
5. It makes later intervention on the untouched side possible, should such intervention become necessary.
6. It gives very good cosmetic results.
7. Its mortality is not greater than that of thyroidectomy.

I will elucidate these different points:

1. Intraglandular enucleation, well performed, shields from all lesions the neighboring organs, particularly the recurrent nerves. This advantage is indicated in some measure in the definition of enucleation, if it be done, as I believe is possible, in most cases without preliminary luxation of the gland. The glandular capsule is incised forward, and the work of separation of the nodule or nodules is accomplished entirely within the capsule, the neighboring organs never being in the path of the operator. Theoretically, then, no injury should be observed in these organs. It is not always so in reality, for Bergeat has observed two instances of paresis of the vocal chords in 179 enucleations by von Bruns and Bailly, one case in 58 enucleations by Socin. It is

difficult to explain the method of production of these pareses in the hands of such expert operators. In any case, their number is very much lower than the recorded 7 per cent in 900 operations by Kocher, the great majority of which were probably thyroidectomies. Is it not on account of the frequency of injury to the recurrent laryngeal nerves that this surgeon has modified his technic and respects that part of the gland overlying the nerves?

I would not insist on the injury of the superior laryngeal nerve which Wölfler thinks to be more frequent than is generally believed, and which according to him, through the medium of anæsthesia of the laryngeal mucosa, is one of the factors in the production of pneumonia by aspiration. It is clear that this nerve is out of reach during enucleation.

It is the same with the less frequent lesions of the trachea, the œsophagus and the pleura. Enucleation of retrovisceral goitres is not always possible, but when practicable, there can be no doubt that neighboring organs are beyond injury. I was convinced of this by a particularly difficult case of this kind wherein I was able, without complication or accident, to enucleate a voluminous tumor, a large adenoma, which distended both sides of the neck, while its middle part passed behind the œsophagus and larynx.

2. It does not expose neighboring organs to secondary lesions due to the process of cicatrization. Paralyses of the recurrents are not always immediate, they may not appear for some days after operation, and are then due to compression of the delicate fibres of the nerve by the tissue of repair. This is an additional reason for avoiding, if possible, all manipulation in the immediate vicinity of the nerve and consequently for executing the enucleation *in situ*, and without luxation. If paresis have been observed after enucleation, it is true very rarely, it has been perhaps because the gland has been displaced or because too rough or too rapid manipulations have indirectly affected the nerve by traction or contusion. It seems evident to me that enucleation, made calmly and gently without luxation, does away with the possibility of secondary injuries.

3. It preserves all normal gland tissue and assures, so far as possible, the continuance of function.

This advantage of enucleation is capital, and on this we must insist. Since the dangers consecutive to the total suppression of the thyroid gland have been recognized, the consequence has been for the surgeons that total thyroidectomy should be proscribed. They therefore replaced the latter partial thyroidectomy, but cases were observed in which operative myxedema followed this operation in spite of the preservation of a portion of the gland. Its appearance has been attributed to the small quantity, or to the lack of function, of the remaining part. Unfortunately we are not in possession, so far as I know, of any means of estimating the functional value of a thyroid and still less of that of any part of a diseased gland, nor the amount needful for the preservation of health. Although the physiologists have been able approximately to determine how much of the gland may with safety be

removed in certain species of animals, we have no precise method of application of their results to the human species, and above all in cases of goitre.

In his report to the twenty-third German Congress of Internal Medicine, Kocher stated that he had observed in his cases of operation for goitre, numbering 3000, 40 cases of cachexia strumipriva after total thyroidectomy, and 33, after partial thyroidectomy. The appearance of cachexia after partial thyroidectomy was, according to him, explained by the fact that in the earlier operations the operative technic had not reached the perfection of to-day, that one could not be certain that there was not aplasia of the opposite lobe, and that, in certain cases, suppuration had not destroyed the remaining portions of the gland. In 13 of these cases partial extirpation of both lobes had been practiced and the remainder of the gland had suffered from the intervention. Finally, he added, that according to his experience cachexia strumipriva is not so grave after partial, as after total thyroidectomy.

These explanations are of certainly valuable, but nevertheless the important fact remains that this surgeon, whose experience with goitre is peerless, has seen cachexia strumipriva following his partial thyroidectomies 33 times, while I know of only one case of this kind following enucleation.

We must not forget the observations made long ago by Sidney Jones regarding the diminution of the volume of the goitrous thyroid after section of the isthmus, nor the case of Poncet in which myxedema occurred after the resection of that isthmus. I believe, then, contrary to the opinion of Kocher, who thinks it would be a grave error to reject the operation of extirpation on the basis of these few unfavorable results, that they are sufficient reason for looking for something better, and that in all cases wherein it is possible, intraglandular enucleation is indicated. The preference given to thyroidectomy seems to me to be due to the more anatomical and orderly character of this method, to the fact that, the vessels being ligated before their section, it is less bloody in expert hands, but do these incontestable advantages outweigh the possible danger of cachexia, as rare as it may be? Certainly not.

Do we not see surgeons adopting the less anatomical procedures because of their better results, for example, abdominal prostatectomy, and furthermore, is it not the rule in operating upon an organ to limit, so far as possible, the mutilations in order to preserve the functions?

Functional troubles due to thyroid insufficiency are of such importance that we must do all that is possible for their avoidance.

From this point of view enucleation merits much more than thyroidectomy the qualification of the "ideal operation," but unfortunately it is not applicable to all cases. There are goitres which are amenable to enucleation, and others which are not, because the gland is wholly degenerated and the tumor is not due to the development of one or more than one nodules within the thyroid substance and separable from it.

We have not the data for solving the question as to what proportion of goitres may or may not be enucleable.

It is even probable, according to certain facts which have come to my knowledge, that the proportion will vary according to countries and regions. I think, however, that Socin was right when he wrote me: "I believe that many a surgeon will have the experience that I have had, that the enucleations increase with the inclination of the surgeon."

4. It should avoid the suppression of the parathyroid glandules. Only since a few years has the work of Mueller, Schaper, Schreiber, Chantemesse et Marie, Gley, Moussu, Jeandelyse and others thrown some light on the anatomy and the functions of these little organs, discovered by Sandstroem, but our knowledge on both points is still very incomplete.

We know that their number, their form, their volume, always very small, their situation and their relations with the thyroid vary markedly. Commonly there are two on each side. The external are situated on the posterior face of the lateral lobe, but at varying height, and are often solidly adherent to the fibrous capsule of the gland. Sometimes they are more or less distant and independent. The internal are, save in rare exceptions, included in the thyroid tissue. Tetany very likely is due to the suppression of the glandules, but we do not know what fractional part of them may be removed without danger of tetany. In experiments on animals this fractional part has been variable, and so far as man is concerned we are in total ignorance. We are no better informed as to the condition of the glandules when the thyroid is modified by goitre, and to my knowledge no research has been made upon this point in the infrequent autopsies which have followed operations for goitre. For these reasons I am unable to make positive statements. The subject calls for further investigation.

From the anatomical facts it is clear that the internal glandule must be sacrificed in all cases of thyroidectomy, and probably very often also the external, while enucleation should generally spare them, as it leaves intact the neighboring thyroid tissue, in the thickness of which they are found.

However, tetany has been observed, although with extreme rarity, following enucleation. I noted in my report of 1898, 2 cases of tetany in 1276 enucleations, *i. e.*, 0.07 per cent, the proportions being 3.64 per cent for total and 0.57 per cent for partial thyroidectomy. Kocher has observed 9 cases after total and 6 cases after partial thyroidectomy.

How is the occurrence of this complication after enucleation to be explained? Possibly it is due to too violent handling, or perhaps to the intimate relation of the removed tumor and the glandules. We must admit that at present we have only imperfect knowledge of these little organs and their special pathology. The fact remains, nevertheless, that if the suppression of their functions results in tetany, it is wise to employ operative methods which give the best chance for their preservation; and further, tetany has been frequently enough observed after partial thyroidectomy to make it a matter for consideration.

5. It makes later intervention on the untouched side possible, should such

intervention become necessary. J. Wolff long ago remarked that after thyroidectomy of one lobe, the other tended to diminish in volume, and although diseased at the time of operation, might atrophy to such an extent as to render further intervention useless. This observation has since been confirmed by a goodly number of surgeons who have studied this question, but it has also been observed that it is far from always being the case. In passing, we may say that atrophy of the side not operated on, of which we do not know the condition, may be a danger and may explain some of the cases of myxedema consecutive to partial thyroidectomy.

On the other hand, the untouched lobe instead of shrinking, particularly in the case of multiple adenoma, may enlarge to such a degree as to render a second operation necessary for the relief of compression. What can be done in such a case, if the first lobe have been entirely or almost entirely removed? Evidently we cannot, without exposing the patient to the risk of myxedema, remove the remaining lobe, for there would not be left a sufficient quantity of healthy thyroid tissue to insure function. We must, then, turn to a limited resection or to enucleation, when possible. Would it not have been better, at first, to have employed the method best calculated to preserve the glandular tissue? The patient would thus be exposed to infinitely less risk, and the surgeon to less anxiety. The glandular tissue saved in the first operation leaves to him the possibility of operating upon the second lobe, without the danger of myxedema, of making an enucleation if possible, or even of sacrificing if necessary a part of the second lobe. The situation would be entirely different, if the first lobe had been entirely or almost entirely removed.

In the cases of multiple and bilateral tumors, enucleation to my mind is the only rational procedure, and according to the conditions of the case, the surgeon can at one operation enucleate all the tumors from both lobes, or at first enucleate only those tumors which by their situation, size, or density are causing trouble, desisting to keep under observation those which remain, and holding himself ready to intervene afresh if it becomes necessary. In cases where recurrence is to be expected, enucleation provides for the future, while, as I have previously said, thyroidectomy may compromise it.

6. It gives very good cosmetic results. The idea that should always be kept in view by the surgeon is to plan operative methods in such fashion that form as well as function may be afterward found in as nearly as possible normal condition. Enucleation presents this superiority, in that it removes only the pathologic tissues forming the tumors and saves their envelope, which is nearly the same thing as the gland before their growth. As a result — apart from the cutaneous scar being insignificant — the neck, if the goitre have been unilateral, regains its normal form, and at the site of operation the deep structures are recovered by the thyroid cushion, which equalizes the contour. Such a perfect result seems to me to be incompatible with the partial or total removal of a lobe, which inevitably leaves a more or less marked depression. The results of thyroidectomy are certainly much superior to what they formerly were,

thanks to the perfection of technic, particularly in the cutaneous incision and that of the muscular layers, but in spite of all that, it cannot be claimed that it restores normal form when it takes away normal parts.

7. Its mortality is not greater than that of thyroidectomy. In my report of 1898, I gave statistics based upon 3408 operations for goitre. This number constitutes the total of the integral statistics very obligingly communicated to me by their authors, surgeons of all nationalities. Partial extirpation figures in 1212 cases and enucleation in 1276, the mortality for the former being 3.46 per cent and for the latter 0.7 per cent.

I am far from attributing an absolute value to these figures. In the first place, we must not forget that thyroidectomy is much the older operation. Its mortality rate must have been raised by the early work in the dark, by errors in asepsis, and by the use and abuse of antiseptics, while enucleation, coming in later, had the benefit of surgical progress.

Furthermore, we know that operative mortality has diminished in such proportions that its relative rate has lost almost all importance. When the difference in mortality is only trifling, it may be due to accidental factors and loses all value in the choice of a method.

I do not go so far as to affirm that thyroidectomy is to-day more dangerous from the point of view of operative mortality, but in any case, I can say that, so far as I know, enucleation is not its inferior as a method. I repeat what I have already said as to hemorrhage, of which the danger is more apparent than real in judiciously chosen cases wherein enucleation is not contraindicated.

As I have already said in many places in this paper, I am far from thinking that intraglandular enucleation should be applied indiscriminately to all cases, and it is now left to me to establish the indications and contraindications.

Everybody is in accord as to the treatment of liquid cysts by enucleation, and no other method equals it in regard to rapidity and perfection of healing. In my opinion, there should be the same feeling regarding operation on such solid benign tumors as present the same characteristics of limitation and connection with the enveloping gland, namely, benign adenomata. It is true that their enucleation is more bloody than that of liquid cysts, but the operative hemorrhage, save in rare cases, is not sufficiently profuse to constitute a real danger. Tumors of large size are exceptional and if bleeding be very free, I do not believe that with the technical precautions I have indicated it need disquiet the surgeon. When the tumors are multiple, which is by no means rare, I see no contraindication, as the different tumors can be enucleated either through a single incision or through multiple incisions of the encapsulating gland. The operation will be prolonged, but its dangers not thereby increased. There are, however, circumstances under which enucleation should be given up, either at the beginning, or during the course of the operation. It is clear that it is much preferable to avoid changing the method during the operation, and that the surgeon shall use all his skill beforehand in the judicious selection of the method.

Extirpation of the gland should be preferred to enucleation in the case of very vascular tumors, above all when pulsatile. To undertake enucleation of such tumors would be too dangerous for the patient, and in such cases partial extirpation of the gland, after preliminary ligation of the subcutaneous and deep veins and the thyroid arteries, can be done without excessive loss of blood. We should, in these cases, unhesitatingly choose extirpation instead of enucleation.

Generally speaking, extirpation will be equally preferable to enucleation in goitres which have previously undergone treatment with parenchymatous injections and have become hard. In these, it is only with the greatest difficulty that we can separate the adenomata from the surrounding tissues to which they have become adherent; the plane of cleavage, normally delicate and easily broken up, is so modified that the operator is in danger of breaking into the tumor itself, and thus losing the advantages of the correctly performed operation.

For the same reason I believe extirpation the only method applicable to inflamed goitres, in which cases also enucleation would expose the gland tissue proper to infection. Furthermore, enucleation is generally impracticable under such conditions.

In conclusion, it is my opinion that intraglandular enucleation is indicated in every case where it can be carried out without danger. It should be given preference in all enucleable tumors, liquid or solid, which are not excessively vascular and where the connections of the tumor with the enveloping gland have not been modified by irritants or inflammation. Partial thyroidectomy should be reserved for diffuse neoplasms or for very vascular adenomata, or such as have become adherent to their glandular envelope.

SUMMARY.

Intraglandular enucleation of goitres or the Porta-Socin operation presents the following advantages:

It does not expose neighboring structures (recurrents, etc.) to immediate or subsequent lesions.

It saves all the healthy thyroid tissue as well as the parathyroids, consequently avoids thyroid or parathyroid insufficience.

It leaves, in case of recurrence, the possibility of intervention without exposing the patient to the dangers of myxedema.

Its results are very good from the cosmetic point of view, and its rate of mortality is very low.

The danger of hemorrhage that might occur has been much exaggerated, and if recurrences are more frequent than after partial thyroidectomy, they are amenable to operation without serious consequences.

Intraglandular enucleation is not useful except for benign encysted tumors, liquid or solid. It is contraindicated if the tumors are exceedingly vascular, or adherent to the enveloping gland because of previous treatment or inflammation.

TRANSACTIONS OF SOCIETIES

CHICAGO SURGICAL SOCIETY

A regular meeting was held December 6, 1907, with the President, Dr. A. J. Ochsner, in the Chair.

Dr. J. B. Murphy read a paper on "Tuberculosis of the Patella." (See paper, p. 262.)

DISCUSSION.

DR. ARTHUR DEAN BEVAN: I have been very much interested in the presentation made by Dr. Murphy, and was much impressed with what he said, especially about the placing of the joint in a condition in which it will resist any possible infection by this chemical inflammation which precedes the operative treatment. I have had but a limited experience with these cases; I recall now but one case of tuberculosis of the knee joint, in which the patella was the primary focus. In that case, we found a single bean-shaped focus in the patella, with an extension of the process to the synovial membrane, and the operation consisted merely in opening the joint, sawing through the patella, finding the focus, removing it, and making a clean dissection of the synovial membrane, with iodoformization, and then closure of the divided patella, and the result was one of the best which I have had in operative work for tuberculosis of the knee.

I want to ask Dr. Murphy, when he closes the discussion, if, at the time he operated on these cases of tuberculosis of the patella, the operation was so planned that the synovial membrane of the joint was removed, and if the operation was so planned that all possible foci in the femur or tibia might have been discovered? I ask this question, because I can remember clearly in my work on the knee joint of finding a number of cases in which there were foci in the major bones, either the femur or the tibia, with, at the same time, involvement of the patella. I did not get a clear idea of the exact technique of the operation, and I would ask Dr. Murphy to bring that out also in his closing remarks, as I am sure it will be of interest to all of us.

DR. WILLIAM J. MAYO, of Rochester, Minn., was asked to participate in the discussion. He said: Mr. President, I was very much interested in Dr. Murphy's paper, and recall one case of apparent primary tuberculosis of the patella, in which the patella was removed with a very good result following. I did not quite catch the technique described by Dr. Murphy. In our case, the parts were approximated with chromic catgut, and the result, as I have said, was excellent.

One thing that struck me was the statement by Dr. Murphy, that primary operation for fracture of the patella had become obsolete. I would agree that the intermediate operation is unsafe, but I have not seen any difficulty from doing the primary operation in certain cases, seen a few hours from the time of the injury, before there was joint effusion, and where there was but little injury to the knee joint outside of the patellar fracture. In the intermediate stage, say from twenty-four hours to the end of a week, unfortunate results sometimes occur following operation.

I was particularly interested in what Dr. Murphy had to say about formalin-glycerine injections. As to what part glycerine plays, I am not able to say. I do know, however, that when we used iodoform in olive oil, in our work, we did not get the good results we got when using iodoform and glycerine, and in talking with Dr. Dudley Allan, in Cleveland, I was rather impressed with the fact that where we have been using ten per cent emulsion of iodoform and glycerine, he had been using about one per cent, and was getting the same results. We came to the conclusion that some of the good might be due to the hygroscopic effect of the glycerine. I shall be glad, however, to try the formalin-glycerine treatment suggested by Dr. Murphy in cases of chronic hydrops of the knee joint. At the same time, before putting anything into a clean joint, before operating on it to prevent possible infection, I shall want more evidence of the value of such procedures than I have at the present time.

DR. W. E. SCHROEDER: I have had some experience with fractures of the patella, and do not hesitate to operate on them as soon as possible, and I do not recall ever having had an unfavorable result by so doing. In the cases produced by an indirect violence, there seems to be no indication for delaying. Here we would only expect a hemorrhage to take place, which could be prevented

by an immediate operation. In the cases in which there have been contusions, I have not hesitated to operate as soon as convenient, with equally good results. The circular suture was used, and the material was catgut, wire, or silk, and with seemingly good results.

DR. CHARLES L. SCUDDER, of Boston, was asked to discuss Dr. Murphy's paper. He said: It is an unexpected pleasure to be here, and asked to attend a meeting of the Chicago Surgical Society. I came merely as a listener.

I have had no personal experience with tubercular osteomyelitis of the patella; but I recall a case of double fracture of the patella in which the bones were so comminuted and literally smashed, that they could be rendered of no use to the individual, but in which both patellæ were removed, and the fracture used to connect the quadriceps with the patellar tendon. In this case the functional usefulness of both knees was excellent. The patella seems to be, under certain conditions, unnecessary for good locomotion.

The custom at the Massachussetts General Hospital, in Boston, has been, for a number of years past, to operate secondarily upon fractures of the patella, but almost all fractures of the patella are sutured, usually not with wire, or a metallic suture, and the operation is done after a week or ten days. I think one of the reasons, in addition to the one suggested by Dr. Murphy, for delay in operating is that the maximum primary effusion is evacuated at the time of the secondary operation, and the joint is then in a very quiescent state, and consequently there is no tension in the joint after the suture. Of course, the reason which Dr. Murphy gave for the secondary operation is the one generally accepted as the important reason for the secondary suture, namely, that sepsis is less likely to occur. I recall no instance of tuberculosis of the patella.

DR. DANIEL N. EISENDRATH: I was much interested in the case Dr. Murphy showed, and in the result following excision of the patella, in that it confirms my observations of one case of excision of the patella, combined with a resection or arthrectomy of the knee joint, in which the power of extension was as perfect as in his case. It also confirms what we have occasion to see quite frequently after fractures of the patella. Last spring, I was consulted by a patient who had a fracture of the patella two years before, and who had separation of two and a half inches between the fragments of the patella. As there was a palpable deformity, the question arose as to whether an operation would be of some avail. I tested the power of extension, which was about as perfect as that in the case exhibited by Dr. Murphy. We find this not infrequently, and our attention has been called to it of late through some anatomical investigations of a German, who finds that there are a considerable number of fibers, which he calls accessory ligaments of the knee joint, which have not been considered in estimating the power of extension of the quadriceps extensor, plus these accessory ligaments, when the patella has been removed. This work confirms, too, previous observations that were made clinically, and puts the matter on a more or less scientific basis. We can now feel safe to excise a patella without loss of power of extension of the knee joint.

I was interested in looking up the statistics of Professor Koenig, who has had a very extensive experience with tuberculosis of bones and joints. In his book, just issued, on Tuberculosis of Bones and Joints, he states that among 720 cases of tuberculosis of the knee joint, the patella was involved fifty times altogether, and of these fifty cases, thirty-three were primary. These are the only figures, so far as I am aware, extant, as to the frequency of the condition. He states that it was practically impossible for him to operate on the patella itself without being obliged, sooner or later, to operate on the knee joint, so that this may have some bearing on future cases. Furthermore, he says that, of the secondary operations, he was obliged to do resection in twenty-two cases, and arthrectomy in nine.

DR. M. L. HARRIS: I have not seen any case of primary tuberculosis of the patella. In all the cases I have seen, in which the patella has been involved, the other bones of the knee have likewise been involved. Although I have removed the patella two or three times in these cases, the operations have always been more extensive than simply the removal of the patella, because other bones were involved, so that the cases are not pertinent to this particular discussion.

Regarding fractures of the patella, it has been my rule to operate on practically all cases. In fact, I operate on all cases unless there is some distinct contra-indication. It has likewise been my rule to wait until the stage of effusion had passed; in other words, until the effusion, which always takes place, begins to subside. That will vary from two or three days to a week. I have been desirous of waiting until the effusion begins to subside, in order not to operate upon a joint which is subsequently going to fill up with fluid. If we operate on a fracture of the patella immediately, the joint will certainly fill up with fluid, and very much increase the effusion, and tend to separate the fragments. Another reason is that the joint, I

believe, and as Dr. Murphy states, is less likely to infection, because the blood, which always escapes into the joint, is one of the best agents we know of to produce a leucocytosis. Hemorrhage into one of the cavities of the body will produce a general leucocytosis within a few hours. I have seen a very small amount of blood effused, into the peritoneal cavity, double the number of leucocytes within two hours, making counts immediately on the receipt of the injury, and every hour subsequently. Blood, therefore, in the knee joint produces a local leucocytosis, which, I believe, is one of the best protective agents against local infection. To me, therefore, the time of election to operation on a fracture of the patella is when the effusion has reached its height, and has begun to decline.

Dr. ALLEN B. KANAVEL then read a paper on "The Complications of Teno-synovitis," which will appear later in this journal.

Discussion on the paper of Dr. Kanavel.

DR. D. N. EISENDRATH: Dr. Kanavel, at the end of his paper, brought out a point in regard to the treatment of the tendon sheaths, whether they should be opened freely or not, and the same with regard to the annular ligament.

When I was in Hamburg, at Sick's clinic, the doctrine was promulgated to proceed in the way Dr. Kanavel has done; that is, open the tendon sheath from one end to the other, following it up through the annular ligament and going through that ligament. Since that time we have had necrosis of the tendon itself, or quite frequently from this radical surgical work, so that it really seems desirable to pursue a more conservative plan, and that is especially true in cutting through the annular ligament. Invariably, the moment you cut through the annular ligament in these cases of severe infection, involving the tendon sheaths, all the tendons prolapse, and it is difficult to get a good result again. It is better to use a paratendon incision, not laying open the entire tendon sheath, but, from the edge, instituting drainage material to establish free drainage without opening the entire radial bursa of the tendon sheaths of the fingers. The same is true of the tendon sheath through the annular ligament. We thus avoid necrosis, if possible, of the tendons.

DR. ARTHUR DEAN BEVAN: I would like to ask Dr. Kanavel, in closing, as to whether he uses the bloodless method in his dissections or not?

Two things have impressed me as being of the greatest value in dealing with these cases: One is complete narcosis, which comes from ether or chloroform, or preferably gas, and the other, making the parts absolutely bloodless by means of a rubber bandage. I am impressed with this fact, that many of the bad results from suppurative processes about the hands and fingers are due to the fact that, without the bloodless method and a general anæsthetic, the surgeon is likely to make an indefinite stab into the finger, or into the palm of the hand, with the idea of draining the pus and of finding a pocket of pus, and as a result of such faulty technique, frequently fails to obtain proper drainage. The most satisfactory thing to me is, to have the patient absolutely under the influence of the anæsthetic, and have the operation absolutely bloodless, starting in at the point of infection to make the dissection, and following up the pus, with the very definite idea, of seeing the gross macroscopic evidence of inflammation, and following that to wherever it leads, and instituting drainage wherever necessary.

I hope that Dr. Kanavel's careful study of this subject will result in his formulating some simple and definite rules which can be of value to us all in treating these hand infections.

DR. KANAVEL (closing the discussion): In reply to the remarks made by Dr. Bevan, I will say that it is my custom to apply a constrictor to the arm while operating, but that I do not apply the complete bloodless method to which he has reference. I loosen this constrictor somewhat, and leave it on as a Bier's constrictor, to produce a passive hyperemia.

Concerning the remarks of Dr. Eisendrath, I will say that splitting of the anterior annular ligaments is a method that has been used a number of years and was first suggested by Helferich, as far as I know. Paulson and others insert a rubber tube underneath the anterior annular ligament, but Forssell has drawn attention to the fact that this is prone to cause sloughing of the tendon, because of the great pressure. If the pockets are properly drained, I have not seen the extensive prolapse mentioned.

CHICAGO SURGICAL SOCIETY

A joint meeting of the Chicago Medical and Chicago Surgical Societies was held January 8, 1908, with Dr. A. J. OCHSNER, President of the Chicago Surgical Society, in the Chair.

Dr. WILLIAM M. HARSHA reported a case of tuberculosis of the tongue and exhibited the patient. (See article, p. 28.)

DISCUSSION

DR. ARTHUR D. BEVAN: In 1893 I saw a case very much similar to this. I had shortly before learned how to stain for tubercle bacilli, and it was a case which I thought at the time was an epithelioma of the tongue. The patient, however, had, as this case has, some tubercle bacilli in the sputum, and the diagnosis in that case was made by taking some scrapings from the lesion of the tongue and staining for the tubercle bacilli. I found the tubercle bacilli in the scrapings, and made a diagnosis of tuberculosis of the tongue. The man had also a fairly advanced tuberculosis of the lungs.

I should like, however, in this connection, to refer briefly to a case in which the question of diagnosis was very important, and in which we had the same pathological process to deal with as here — a man of 50, with a lesion on the glans penis, which, from macroscopic appearance, was apparently a typical epithelioma; I believe it was a typical epithelioma. Amputation was advised; a section of tissue was taken and examined, and much to my surprise, and to the surprise of the men associated with me, we found it was not epithelioma at all, but a case of tuberculosis of the penis, resembling clinically very closely an epithelioma.

I think the case is an important one, as Dr. Harsha presents it, especially from the standpoint of differential diagnosis.

DR. JOHN B. MURPHY: I wish to congratulate Dr. Harsha on the presentation of this case, particularly on making the diagnosis before the operation. The case, as it presents itself, has all the classic forms of tuberculosis; namely, it was first a submucous tuberculosis from inoculation from a tooth, and that remained beneath the mucosa for a considerable time, and he had an ulcer appearing on the surface, giving the ulcerative variety where the mucosa is destroyed, leaving a primary lesion and a superficial lesion, and each of the two succeeding ones in this case was in advance of that, and of the ulcerative variety.

In the differential diagnosis, there is no growth in the tongue that is so hard to differentiate, either macroscopically or microscopically, as a tuberculosis of the tongue, as the appearance of the ulcer is not present.

With reference to the microscopical examination, scrapings from the tongue are often the scrapings from the lungs; that is, they come up and have been deposited on the tongue. That has been shown a number of times. The tuberculous material is found in the crevices of the tongue, as well as in the crevices of the ulcer, which does not indicate that it came from the ulcer of the tongue; and then comes the unsatisfactory part, namely, often you do not find the typical or classical picture microscopically. There is an absence of the giant cells. You find epithelial cells mixed together so that they do not present the typical form under the micoscope, and that accounts for the absence of a diagnosis of the first microscopical examination, as reported by Dr. Harsha. The diagnosis, from the macroscopic standpoint, is made by the secondary enlargement of the glands; its resemblance to epithelioma, and in a number of these cases the glands, when examined secondarily, do not show the typical tuberculosis, but a mixed infection. They are either encapsulated tuberculous glands, or it is simply a mixed infection.

The clinical course is always doubtful. It is as grave a lesion in itself as carcinoma of the tongue, and then you have added, the original primary tubercular lesion.

Dr. Harsha is to be congratulated on this case. Why? Because there was no evidence of tuberculosis any place in the body that was recognized at the time the patient presented himself, and the evidence of tuberculosis did not appear until a long time afterwards, and primary tuberculosis of the tongue is a rare disease.

The prognosis is unfavorable, even after radical removal of as large a portion as we would ordinarily remove in a case of epithelioma of the tongue. It requires the excision of a larger portion than in excision for carcinoma, to feel that the patient is free from the secondary return *in loco*.

DR. WILLIAM ALLEN PUSEY: In connection with this case of Dr. Harsha, I should like to report a case of tuberculosis of the mucous membrane of the mouth and tongue, which was recently under the joint treatment of Dr. Thomas L. Gilmer and myself, the diagnosis of tuberculosis being made by Dr. Gilmer before I saw the case. Although I did not hear all of Dr. Harsha's paper,

I think our case presented very distinct differences from the one which he reports.

In this case the lesions corresponded to the very superficial tuberculous ulcers which sometimes occur about the mucous orifices of the body, in connection with systemic tuberculosis. There were lesions on the tip and side of the tongue, on the buccal mucous membrane, and upon that of the soft palate. There were no enlarged glands, and there were no deep ulcerative lesions. The case was not one of tuberculous gummata. In our case, the difficulty of diagnosis was not from epithelioma, or from other malignant growths, but from lesions which produce very superficial excoriations. The lesions here were extremely superficial ulcerations, covered by a necrotic membrane, and surrounded by an inflammatory areola. They most closely resembled extensive mucous patches. Another condition, which had to be excluded in this case, was pemphigus, beginning in the mouth. Pemphigus occasionally begins in the mouth without lesions elsewhere and it may produce lesions in that location quite identical in appearance with the superficial lesion of tuberculosis which occurred in our case.

In all of these cases of tuberculosis of the mouth, a positive macroscopical diagnosis is, I believe, impossible; but in most cases, it is my impression that the microscopical diagnosis is not difficult, because tubercle bacilli are to be found abundantly in the scrapings from the ulcers, and are comparatively easily found in the tissues — with nothing like the difficulty that attends their finding in lupus.

In this case, the structure was that of a typical miliary tuberculosis. The original diagnosis was, in fact, made upon the structure, and no difficulty was found in demonstrating the bacilli in the tissue. I think these lesions are extremely rare, certainly excessively rare without systemic tuberculosis. In our particular case, there was slight, if any, evidence of active pulmonary tuberculosis, but there was evidence of old tuberculosis, and the patient was extremely cachetic. The course of the case was rapidly downward. The lesions were excruciatingly painful, so that the taking even of bland liquid food was attended by great pain, and solid food was impossible without first spraying the lesions with cocaine. The patient died within two months after the development of the lesions in the mouth.

DR. L. L. MCARTHUR: I rise to make a query of Dr. Harsha relative to his case, as to whether an exquisite tenderness and painfulness of this lesion existed, such as exists in lesions of that kind of which I have had personal cognizance. In this case, the tenderness and suffering from the lesion were to be likened to ulceration which comes from an X-ray burn — painful to the slightest touch.

I had occasion to make a diagnosis and remove a growth of this kind from a patient of Dr. Frank Carey's, fifteen years ago, and the diagnosis was made by means of the microscope. I think, practically, we have three things to differentiate in ulceration of this type. It is either epithelioma, tuberculosis, or syphilis. The other lesions are so rare that they are hardly to be considered, and if epithelioma is ruled out by microscopical examination, which it can be, there remains but the syphilitic and the tubercular types to be considered. With a syphilitic lesion, we have simply the round cell lymphoid infiltration tissue. With multiple sections from the fragments removed, we can ultimately find giant cells, and find in them the tubercle bacilli.

I do not feel like agreeing with the extremely grave prognosis that Dr. Murphy gives in regard to tuberculosis of the tongue. I think that the radical removal will offer a far greater hope of recovery than in cases of carcinoma.

DR. HARSHA (closing the discussion): In regard to the discussions which the gentlemen have kindly made, I will say that in Della Vedova's article there is set forth the result of an extensive study of the subject. He says that it is a difficult matter to make a diagnosis from scrapings, or from sections, taken from the nodular or submucous type; that the bacilli are not commonly found in the tissue, and that the best way to make the diagnosis is to cut out a section from the border of the ulcer. The first section in this case showed nothing more than inflammatory tissue. It showed no bacilli, and no typical tubercular histological formation.

The second microscopical examination was made from the section including the whole border of the ulcer, and was positive. Now, these ulcers were not entirely superficial. They were not like mucous patches; they went through the fascial layer, and down to the muscle. Another characteristic was that, in spite of ordinary treatment — the cautery, expectant, and antiseptic treatment — they spread peripherally, but were not ragged.

In answer to Dr. McArthur, I will say that neither the ulcers nor the primary nodule were at all painful. The first one, the nodule, had on top only a minute ulcer. There was no pain on handling it. It felt hard, and seemed only to interfere somewhat with movement of tongue and with phonation.

DR. WILLARD BARTLETT, of St. Louis, Mo., read a paper, by invitation, entitled The Prophylactic Use of Filigree in Infected Wounds of the Abdominal Wall. (See paper, p. 274.)

DISCUSSION ON DR. BARTLETT'S PAPER

DR. D. A. K. STEELE: I wish to congratulate Dr. Bartlett upon the success that has attended his efforts in the last six years in the introduction of a silver wire filigree within the muscles or beneath the muscular sheaths or fascia of the abdominal wall, as a permanent barrier to post-operative hernias; and especially on his paper to-night, which teaches us that it is possible to implant a filigree in an infected wound of the abdominal wall, and have its silver strands become a permanent part of the scar tissue, preventing hernia, and causing no local irritation, even though in the lapse of time the original network may become broken or separated into fragments.

These results have been exceedingly interesting and instructive to me, because I have always regarded the permanent introduction of non-absorbable material — such as silver wire, iron wire, silk or silkworm gut — into the living tissues as objectionable, on account of the frequent necessity for its removal later on by reason of irritation, infection or discomfort to the patient. Many times in the last thirty years I have been called upon to remove buried loops of wire or silk that had produced distressing symptoms, and I know that Phelps' permanent silver wire sutures in hernia have many times required removal for the same cause.

Up to this time I have had no personal experience in the use of Dr. Bartlett's filigree, but predict that, in the hands of a less expert surgeon, it will occasionally fail, irritate, or require removal. I admire Dr. Bartlett's ingenuity, enthusiasm, persistence and success, and have no desire in any way unfavorably to criticise his method, while expressing a personal preference for autoplastic methods, and my belief that in similar cases to those described by him it would be perfectly feasible to bring the muscular or aponeurotic structures in close apposition by the use of the herring-bone suture of chromicized catgut or kangaroo tendon, that would give equally as good permanent results. Although I must also say that there are certain cases, where there is a large defect in the abdominal wall, where better results can probably be obtained by using the filigree. I presume it would not be applicable in the abdominal wall of a young child or in a pregnant woman.

It seems probable that the implantation of continuous loops of silver wire in granulation tissue is less likely to be disturbed by the contractions of overlapping muscular planes occupying different levels, and contracting in different directions, in the abdominal wall, than would be caused by single loops of wire.

The skiagraphs in the three cases subjected to the X-Ray all show the filigree broken into fragments after five and one half years, over two years, and a couple of years, respectively. Will these fragments cause any subsequent irritation after they have answered their purpose in curing or preventing a hernia?

DR. ALEXANDER HUGH FERGUSON: We are indebted to Dr. Bartlett for again bringing to our attention this device for the prevention and cure of hernia. I am not in a position to discuss the filigree, inasmuch as, so far, I have not seen a case which I have not been able to handle satisfactorily by plastic procedures. There have been, however, some cases in which I have refused to operate. These might be suitable for the filigree.

I was much interested in what Dr. Bartlett had to say at the meeting of the American Medical Association in Boston, and was favorably impressed with the results obtained from the use of the filigree under certain very rare conditions, but the doctor makes a bold stroke here to-night, and advises the use of the filigree as a prophylactic measure in suppurating wounds of the abdominal wall. This has been a source of astonishment to me, and at first thought I would be inclined to pass it aside as unsurgical; however, I will reserve that decision until more cases have been presented to us, and until Dr. Bartlett either makes a complete success, as shown by the report of his own cases, or those of others, if in the mean time he does not discard the filigree. One can very readily perceive the advantages for using the filigree. For instance, in the case of very large, gaping wounds, it is much easier to insert the filigree, although I will not say that it is less dangerous, than to approximate the tissues by well-known surgical methods. The ease of application would induce a great number of men to try it, who, probably, would not undertake a plastic operation.

The author's statistics are in favor of it, although sufficient time has not elapsed since he began to use it, as he has pointed out. The various bits of wire may give trouble later on. In fact, the instability of any foreign material in the tissues of the body, except those that are purely passive, is well known, and the action of the juices of the tissues upon the different foreign materials, especially metals, is fairly well known. It is not at all a new thing that silver wire will remain in place, and

granulation tissue form over it, in a suppurating wound, and eventually become encysted. The same is true of aluminum bronze and of the wire used by dentists. The juices of the tissues have a digestive action on the wire, and the active motion of the abdominal walls tends to break it up. That we know from our experience with the use of silver pins in holding bone-fragments together. In two or three weeks there is nothing left but the iron. The silver is all dissolved away from the nail.

Whether the cures effected by the filigree will be permanent, it is too early to say. The first disadvantage of the filigree is, that it is a foreign body. Second, it is instable in the tissues. Third, it is questionable whether it is a prophylactic against hernia. We have other means, better ones than the filigree, for the prevention of hernia. In most cases of postoperative, hernia, the indications for operation are clear, on account of the disturbances which they produce. The hernia gives rise to adhesions and agglutination of the bowel, so that the insertion of a filigree, without opening the abdomen, and liberating the adhesions, would not cure or relieve the sources of pain and discomfort in many of these cases.

DR. M. L. HARRIS: Ever since wire methods were brought out by Witzel in Europe, and Phelps in this country, I have been unfavorable to them on the ground that it was the implantation of a non-absorbable material which we know from experience usually comes out sooner or later. I, therefore, have had no experience in implanting silver wire filigree, but I have had some experience in taking them out.

The first case which I had was some two years ago. The patient had been operated on several times, primarily for appendicitis, I believe, and then to close a ventral hernia, and finally a wire mattress or filigree was implanted in the abdominal wall. It healed in nicely, but, after a time, it gave the patient so much trouble and so much pain that he absolutely insisted on having it removed. It affected him, mentally as well as physically, so much that he threatened suicide unless I got that mattress out. The wire had broken up into small pieces, each one of which furnished one or two ends which were sticking in the tissues. I worked for a couple of hours in digging and taking out these numerous little pieces of wire.

The next case was more recent. In fact, it is only about two weeks ago since I had to take out another mesh of silver wire buried in the abdominal wall. This patient, too, suffered considerably; and it illustrates the fact which Dr. Bartlett mentioned, namely, the adhesions formed on the peritoneal surface between the omentum and other structures. How much, if any, of these adhesions were present before the wire was put in, of course I do not know. But I was much surprised to find how much wire lay directly beneath the peritoneum, where it evidently was put in in loops about the fascia or tissue. It lay directly flat and just beneath the peritoneum in loops; and beneath were numerous adhesions to the intestines as well as to the omentum. I had considerable difficulty in taking out all of this wire.

With this limited experience in these cases, I am not very favorable to implantation, although I must say that the results reported by Dr. Bartlett are certainly very good. It is to be hoped that the method in the future will prove successful, and that surgeons will not have to take out these mattresses as they have had to do in the past.

DR. E. W. ANDREWS: We have had two valuable contributions from Dr. Bartlett—his modification of the cumol catgut sterilization and his modification of the Phelps and Willy Meyer filigrees. Both are highly praised by men of large experience, so that this opinion cannot but influence our judgment favorably.

The problem of closing a wound, such as that resulting from suppuration in the abdomen, is the only one embodied in Dr. Bartlett's paper to-night. The problem of closing a newly formed wound is a simpler thing. Dr. Ochsner has shown that in a case of simple femoral hernia, the chances are that, in the average case, where nothing more is done than the extirpation of the contents of the canal, complete union will take place after extirpating the sac. I have thought, in many cases of inguinal hernia of small size, our elaborate methods were possibly not necessary. Elimination of the peritoneal sac high up, with a slight support of bandages, allows the muscles to fall together, insuring often complete primary union. When we come to deal with the results of a suppurating wound, we are confronted with the problem of greater difficulty.

When the good mother closes a rent or a hole in the seat of trousers, she must do in it one of two ways. She must put on a patch or darn the hole. There is one thing she cannot do; she cannot sew it together laterally.

The same principle applies in closing wounds caused by injury or suppuration of the abdominal wall. The use of a patch or the use of the darning needle becomes essential.

The use of a patch brings us to innumerable efforts to close up hernial openings by a plastic flap; and, if you will look over literature, you will

see the multiplicity of operations of this sort that have been advised. Turning out the anterior rectus sheath, making a trap-door flap, turning up a trap-door flap from the fascia lata, invaginating the skin, inserting a bone-plug into the opening, the insertion of a silver plate, or the insertion of Phelps's wire coil, etc., and finally it brings us to the modification of Phelps's wire coil, the wire filigree of Meyer and that of Bartlett. The flap method consists of a plastic patch. The darning method is a new thing in surgery, and as I understand Dr. Bartlett, he has adopted a new principle. He inserts a filigree, which is a piece of darning work done over pegs before it is put in place. If I have a clear picture, it is simply this: that over a row of pegs a filigree is constructed by first darning artificially. Thus a kind of net-work is constructed which is able to stand alone and hold its shape. If I am right, we have a principle analogous to that of heteroplasty, as seen in the Moorhof bone-plug. This plug is absorbable and (unlike paraffin) is slowly displaced and replaced by fibrous or bone tissue. So with the wire net-work: granulation tissue and connective tissue fill out the interspaces. There can hardly be any question as to the practicability of this framework to fill large gaps.

Two principles, then, are available for large defects: the principle of the patch, and the principle of cross-bridging or darning. I have only to remind you that the darning principle is used in other ways, as when we bridge a gap in a divided tendon, or even a nerve, with strands of catgut in order to furnish a framework for tissue to regenerate upon.

Willy Meyer's filigree (shown at the American Surgical Association, 1902), is a loose-woven gauze of silver wire. Dr. Bartlett's form is lighter, and contains less waste or useless strands to cause irritation.

DR. BARTLETT (closing the discussion): Dr. Steele expressed the fear that this filigree would ultimately irritate the tissues so as to require its removal. I will not contradict that, because it may do so. The wire, however, is very fine, and in these 36 cases I have reported, varying from a few months to seven years, I have not personally seen any irritation in a single case, except one, where a portion of the filigree was right beneath the skin. I can not state, however, that some of the patients have not presented themselves to other surgeons, but they have not come back to me and complained of irritation. I never tell a patient when I introduce one.

In regard to autoplastic procedures, I agree with Dr. Steele that if an autoplasty can be used it is preferable to the implantation of a foreign body. He spoke of a child's abdominal wall. I introduced a filigree into the abdominal wall of a child, 12 years of age, four years ago, and there has been no impairment of development in that part of the abdominal wall.

With reference to pregnant women, I implanted a filigree in a woman who had had a hernia of sixteen years' standing. She became pregnant a year and a half after implantation, went through her pregnancy without the slightest damage, which occurred over a year ago, and no hernia has resulted.

Dr. Ferguson stated that no case had presented itself to him which he could not close by plastic means. I saw an extreme case closed by autoplasty this morning by Dr. Ochsner, and the majority of post-operative herniæ can be closed by autoplasty. Dr. Ferguson very fairly mentions the fact that cases now and then present themselves in which operation is refused, but which might be treated by filigree. I will state in this connection, that one of the most extreme cases I treated with filigree was a woman with a ring, measuring four and a half inches in diameter, very firm, which could not be approximated by two or three inches. Perhaps some of the rest of you could have done so. I have in the hospital now a woman in whom there is a ring of five by seven inches in size. If any of you think you can close that opening by autoplasty, I will be glad to send the woman up to you. I will not attempt it.

Dr. Harris mentions having taken out filigrees, but he was kind enough not to say I put in any of those which he took out. If he has taken out this form of filigree, I am perfectly willing that he should say so, as I want to have a fair grasp of the subject.

Dr. Harris also refers to those cases which sometimes necessitate removal, and mentions the fact that there are intra-abdominal adhesions to the scar. I should think it would be difficult to tell whether it was the filigree which caused the symptoms of adhesions or the conditions caused by the adhesions. However, I am not posing as a discusser, but as the discussed.

Dr. Andrews, I believe, fairly hits the nail on the head in making his remarks. A sort of trellis is formed. The filigree constitutes the network around and in which excessive scar tissue is built, and therefore, it is the resultant excessive scar tissue, and not so much the wires which cure the patient. My idea coincides with the statements of Dr. Ochsner. It is probable (because these things are placed parallel between the tissue planes) symptoms do not result, as would be the

case if the muscles are caught in the loops of permanent silver sutures.

I sincerely thank you for the discussion. It is really a pleasure to learn a lot of things about yourself and about your device, even though the remarks are not as flattering as one might expect. But I will state, in regard to the contrivance, not exactly in self-defense, that I have claimed nothing but temporary benefits in these cases. The oldest case in which filigree has been used is now nearly seven years, and it is all right so far. Only ten months have elapsed on the average in five cases where the filigree remains in an infected wound. I became enthusiastic after finding out that these things would heal in pus wounds, and when I found they would stay there ten months, I could not help telling you and others something about it.

DR. A. D. BEVAN and DR. WALTER HAMBURGER read a joint paper on Three Cases of Human Glanders.

DISCUSSION

DR. MAXILLIAN HERZOG: Dr. Bevan has asked me to discuss his paper, and I rise to make a few remarks on the subject of glanders. Glanders is naturally a disease of horses and other solipeds, and it is very common almost all over the world in these animals. Australia, however, has kept free from this disease. If we consider what a large number of horses are infected, and that these infected animals are handled for long periods of time by human beings, then we can see the frequent chances for infection: however, the danger of infection ordinarily does not seem to be very great because man does not contract glanders from the horse very often. On the other hand, a comparatively large number of laboratory workers, handling cultures of the bacillus mallei, have infected themselves, and have contracted the disease by inhaling the bacilli.

The pathological lesions of glanders, as far as horses are concerned, are divided into the glanders ulceration, the glanders abscess, the glanders infiltration, and the glanders induration. So far as the human being is concerned, we must mention a fifth type of pathological lesion, which is, so far as the diagnosis is concerned, most important indeed — the glanders pustule. So common is the pustule in human glanders that most cases of human glanders have been wrongly diagnosticated as smallpox, particularly in countries where vaccination is not general. I had occasion to see the material from two such human glanders cases in Manila. These two cases were diagnosticated as smallpox, and the material handed over to two gentlemen, who were studying smallpox in Manila at that time. They recognized that the disease was not smallpox, and the bacteriological investigation by Dr. Werry established the diagnosis of glanders.

Commonly, the disease in the human simulates either smallpox, pyemia, erysipelas, or syphilis. Of course, it ought to be very easy to differentiate glanders from those diseases, because examination of the pus from the lesion shows the typical bacilli, and we have an absolute test which can be made in a few days, namely, the biological test, which has been mentioned this evening, the inoculation of the guinea pig. If you take material obtained from a case of glanders and inject it into the peritoneum of a guinea pig in the region of the bladder, there will develop a swelling of the testicles and microscopic examination reveals large numbers of bacilli in the inflamed serous surfaces.

The agglutination test has been mentioned. That test, so far as I am aware, has not been tried in the case of human infection. In the case of glanders in horses, it has been tried, but found wanting, for the following reasons: The normal horse blood-serum varies greatly in its agglutinating value towards the glanders bacillus, and, again, blood-serum from horses having the disease, also varies from several hundred to several thousand times, so that according to veterinarians who have had a large experience with the test, it is not to be considered reliable. An English veterinarian has tabulated several thousand cases, and he came to the conclusion that the agglutination test is not reliable. The mallein test is much more reliable. But we have, in the biological test, a very reliable diagnostic method which can be made in a few days.

Glanders, in the horse as well as in the human, may run an acute or a chronic course. Dr. Bevan told us to-night that two of his three cases are on the road to recovery. That may mean that they will get permanently well, or it may mean that a sudden acute exacerbation will occur which may terminate fatally. In both of the Manila cases the patients, after chronic manifestations, died speedily from a general dissemination of the bacilli. Of the cases that have been reported to-night, one presented an abscess, not in, but over the joint. One of the Manila cases showed the same condition.

Dr. Bevan is to be congratulated on having established the diagnosis, and his work in connection with these cases forms a valuable contribution to the subject of glanders in the human race, a subject which has not been thoroughly worked out.

DISCUSSION OF DR. BEVAN'S PAPER ON GLANDERS

DR. F. ROBERT ZEIT: I wish to add two more cases of glanders in our city, one a chronic case of Dr. J. T. Campbell, and the other an acute case with pustular eruption, which occurred in the practice of Dr. Bayard Holmes, at Wesley Hospital. The patient was suspected of having smallpox, and Dr. Holmes asked me to see the case. The eruption came on over night. The patient came to the Hospital on Friday, and Saturday morning there was a generalized pustular eruption. The clinical picture, at first sight, was that of smallpox. The pustules covered nearly the whole body, but were most numerous on face, arms, shoulders and chest. Probably some of you have seen photographs of this case. There was a bloody, seropurulent discharge from the nose, with swelling of the face. There was marked œdema of the scrotum and a large gangrenous ulcer of the glans penis. Upon closer examination of the pustules we decided that the case was not one of smallpox. The pustules were of different sizes. The majority of them were of the size of small peas. None of them was umbilicated. There were some papules. We concluded that it was not smallpox. In view of the presence of a large sloughing ulcer of the glans penis, we naturally suspected a pustular syphilide. We made cover glass smears of a number of the pustules from different parts of the body, and to our consternation found great numbers of bacilli in all the smears. There were as many as thirty or forty bacilli to every field. The patient died the same day (Saturday). He was a teamster. There is no question that cases of glanders can easily be mistaken for smallpox, and that they are more numerous in the city than we have heretofore supposed. Such slightly atypical of suspected cases of smallpox may go to the pesthouse on account of the great similarity of the two diseases, and die there; and the fact that they die there, might easily lead to the conclusion that they have had smallpox. Unless one is specially on the lookout for glanders, smallpox is diagnosed.

The diagnosis of glanders is comparatively easy. A cover glass smear of the pus from the pustules shows large numbers of bacilli, somewhat longer and thicker than tubercle bacilli. They stain irregularly, and therefore are somewhat striated. With Loeffler Blue and heating, the portions rich in chromatin stain deep blue; the ground substance remains pale. This irregular staining of the bacillus produces the peculiar striated appearance.

In our case we also made cultures and had typical potato cultures of glanders bacilli. By typical, I mean a potato culture which looks macroscopically very much like the staphylococcus aureus, and if a careless microscopical examination of this culture is made, one can easily conclude that it is the staphylococcus aureus instead of the bacillus of glanders, on account of the irregular staining of the bacilli in striæ, and globules which then appear like cocci in a delicate network. To guard against this common error, thin smears of suspensions are necessary when examining cultures.

The other case was one of chronic glanders of long standing. A young man, who had been engaged by the English government to bring loads of horses from New Orleans to South Africa during the Boer War, came to the clinic of Dr. Campbell with an ulcerative inflammation of the mucous membrane of the nose. He had an ulcer which nearly perforated the septum, very much like the characteristic typical ulcer that forms in horses with glanders, that is, a perforating ulcer of the septum. He had enlarged lymph nodes of the neck, axilla and groin, and numerous scars in these locations from former surgical removals of nodes and curetted suppurating glands. On the ship on which he was, nearly all the horses developed a discharge from the nose, enlarged lymph nodes which suppurated, and swollen lymphatics, and nearly three-fourths of them had to be thrown overboard, dying rapidly. Of the men who attended to these horses, a number died, having similar symptoms.

The acute cases die in the course of two or three weeks. But what becomes of the chronic case? It apparently never gets well. It may take on an acute character and prove fatal at any time; or it may remain chronic for years, as in this case. I have lately heard from this young man through a physician in St. Louis, and find that he still has the same symptoms. He occasionally goes to a surgeon and has suppurating lymph nodes removed or curetted. He still has the same disease. Potassium Iodide has no effect.

I am very glad to have listened to the interesting papers of Drs. Bevan and Hamburger, which go to show that glanders is more prevalent than generally supposed, if looked for carefully. The acute cases are hopeless, but in the chronic cases the judicious use of Mallein might be tried. Only few cases become immune and recover.

DR. ADOLPH GEHRMANN: I would like to mention a still earlier case of glanders, than the one related by Dr. Zeit, and which was demonstrated before this society some fifteen years ago. This case also occurred in the practice of Dr.

Holmes. The young man had an infection about the neck. The bacteriological work was done by the late Frank S. Billings in this city, and I remember very well his demonstration of a guinea pig before the society.

Glanders, as it occurs to-day, probably should not escape our attention as it did years ago. I am quite sure, there were cases of glanders which escaped attention of clinicians, surgeons, and bacteriologists entirely, and that we had more cases of glanderous infection in the human subject than we have to-day. I remember having to do with the infection in street-car horses, which occurred in epidemic form in different barns years ago, before the introduction of our modern methods of transportation. A barn at 39th Street and State was a veritable hotbed for glanders. Numerous horses died of glanders, so that we had an opportunity to test the accuracy of the mallein test; this test was made and the animals that reacted were taken to the stock yards and slaughtered. I was present on a number of occasions, and saw from 12 to 20 horses at a time condemned on the test. Dr. Trumbower, State Veterinarian at that time came, to the conclusion that he could not be absolutely sure of the mallein test in horses. Some horses were infected as was proven by taking specimens and making bacteriological examination. We found horses that reacted clinically in which there was no lesion which we could attribute to, or consider as, being glanders. Therefore, its value in the chronic case as a diagnostic method was not favorably considered. To-day, of course, under bacteriological methods, especially the biological test on guinea pig, and keeping in mind the possibility of this infection in any case, the diagnosis could be made a certainty.

In this connection, I recall an interesting report from the Royal Victoria Hospital of Montreal, of a case of glanders in a man who lived having the disease for about seven years, having several exacerbations, but finally died of a generalized infection.

Dr. D. A. K. Steele reported cases and exhibited the following specimens: (*a*) Stab Wound of Fetus in Utero at Six and a Half Months. Delivery of Live Child at Full Term. (See paper, p. 293). (*b*) Inversion of Uterus During Labor, with Subsequent Gangrene. (*c*) Fibroma of Broad Ligament.

REPORT OF A CASE OF AN INVERSION OF THE UTERUS FOLLOWING DELIVERY; WITH GANGRENE. OPERATION — HYSTERECTOMY. DEATH FROM SEPTICÆMIA. AUTOPSY.

November 23rd, 1907, I was called to see Mrs. P. B., age 23, who presented the following history: She was delivered by a midwife on the 21st of November of a normal male child. There were no complications. The labor was easy, and, after caring for the infant, the midwife attempted to remove the afterbirth, which she said came away easily and without much traction. Immediately after its removal, the patient began to flow profusely, and the midwife noticed the protrusion of a large, fleshy mass from the vagina, which she at first mistook for a second child. She attempted to deliver it, and finding that impossible, and that some unusual complication was present in the case such as she had never seen, she sent for a neighboring physician, Dr. J., who diagnosed a complete inversion of the uterus and attempted to replace it, but did not succeed. He gave the woman ergot and morphine and advised waiting. Several hours later, another physician was called in consultation; chloroform was administered, and the uterus was believed to have been replaced, and the inversion overcome. About 4 o'clock Saturday morning — the day that I was called in consultation — 48 hours after delivery, the uterus was again found to be inverted and protruding from the vagina. There was a fetid odor, the uterine mucosa and muscularis were gangrenous over the protruding fundus, and I immediately called an ambulance, and had the patient removed to the Woman's Hospital, where Dr. H. M. Richter operated, doing an abdominal hysterectomy.

Before the removal of the uterus he incised the walls, ascertaining that the gangrenous condition of the mucosa extended quite to the serosa through the entire thickness of the uterus, covering an area several inches in diameter. Upon opening the abdomen, the ovaries and tubes were found lying within the inverted uterus.

The operation was done expeditiously, and the patient returned to bed in good condition. The gangrenous organ was examined by Dr. Henry T. Byford, who concluded no other treatment than a hysterectomy was advisable. The patient reacted fairly well, but developed symptoms of acute septicæmia and died on the morning of the 25th. A post mortem examination revealed a small mural abscess in the abdominal wall, extraperitoneal, containing ill-smelling purulent fluid. There was no infection of the peritoneal cavity, the intestines being smooth and glistening. Perfect closure of the uterine stump without any evidence of infection. A small quantity of serous fluid found in the abdominal cavity near the spleen. Portions of the heart, liver, kidneys, spleen, and abdominal wall were taken for microscopic and pathological examination.

Dr. Richter will furnish a report of the result of

these examinations. The specimen is herewith presented for your examination.

Pathological Report, by Dr. H. M. RICHTER.

For assistance in studying the specimen I am indebted to Dr. F. R. Zeit.

The uterus was of about the normal size for a full-term organ, but completely inverted, presenting the mucosa externally. It was very dark, apparently gangrenous, over the greater part of the presenting fundus, of an extremely foúl odor (colon bacillus). The peritoneal surface was little altered, presenting no exudate.

Microscopically, the uterine wall shows marked œdema; engorged blood vessels with hæmorrhages; extensive purulent infiltration, most marked on the mucosa side of the muscularis, but extending to the peritoneum; extensive necrosis everywhere, down to the peritoneum. Everywhere, also, the tissues are packed with colon bacilli.

The changes are probably of two-fold origin; circulatory and infective, the latter, a colon bacillus infection, being grafted upon the uterus, whose return circulation was interfered with.

REPORT OF AN ENORMOUS FIBROID OF RIGHT BROAD LIGAMENT.

Patient, Mrs. M. R., of Rantoul, Illinois, was referred to me by Dr. Brewer with the following history:

Married; age 43; mother of two children; enjoyed good health until February, 1907, when she noticed that the abdomen began gradually to enlarge. The enlargement was first noticeable on the left side. In two or three months it was symmetrical — a uniform enlargement, filling the abdomen from below upwards. There was no marked change in her menstruation, which continued regular, but a little more profuse than usual. During May she suffered considerable pain in the abdomen. In October the enlargement was so great as to cause so much discomfort that she decided to seek relief through an operation. November 6th she entered the Woman's Hospital in my service, and presented the appearance of a woman at full term. The abdomen was uniformly enlarged, was very tense, somewhat irregular in form, and presented the appearance of a very large multilocular ovarian cyst. She was seen in consultation by Dr. Henry T. Byford, who concurred in the diagnosis.

November 8th, at 8:30 A. M., I performed a laparotomy, removing the tumor, which was found to be a very large fibroma, developing in the right broad ligament, and undergoing myxomatous degeneration. The uterus contained three small subperitoneal fibroids that were removed at the same time.

The patient recovered promptly from the operation, leaving the hospital on the 19th day, entirely recovered.

The pathological examination of the tumor was made by Dr. Jean M. Cook of the Pathological Laboratory of the College of Physicians and Surgeons, and the report is as follows:

REPORT OF EXAMINATION OF BROAD LIGAMENT TUMOR, NOVEMBER 14, 1907.

Fixing general formalin imbedded in paraffin, stained hematoxylon and eosin. The tumor mass weighs 20 pounds; is ovoid in shape; has a very dense capsule. The ovary is attached to one side of the growth, but is not a part of the tumor. The ovary is cystic; very small cysts attached to the tumor, some of which contain mucilaginous substance. Microscopical sections of the growth show it to be a fibroma, which is undergoing myxomatous degeneration in many directions. Sections were made from various parts of the growth and no evidences of malignancy could be found. The bundles of fibrous tissue in the tumor run quite regularly, and in no place seem to be very dense, showing a rather rapid growth.

Diagnosis: Soft fibroma of the right broad ligament, with myxomatous degeneration.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

JOHN B. MURPHY, M. D. — E. WYLLYS ANDREWS, M. D.
FREDERIC A. BESLEY, M. D. — WM. R. CUBBINS, M. D.

EPULIS AND THE RESULTS OF ITS TREATMENT. By Dr. R. Kühner, from the Tübingen Clinic, Prof. von Bruns, Director.

Kühner reports 90 cases from the records of the Tübingen Clinic, occurring between 1870 and 1905. Of these 31 were microscopically examined, the findings being as follows:

Giant cell sarcoma	20
Spindle cell sarcoma	2
Fibro-sarcoma	4
Fibroma	2
Osteo-fibro-sarcoma	1
Osteoma	1
Granuloma	1
Total	31

Influence of sex. Of the 90 cases, 57 or 63.31 per cent were in women, and 33, or 30.71 per cent, in men. This comparison agrees with the quoted statistics of other authors.

Age. Average age of all 90 cases, 26 years and 4 months. Of the men alone, 18 years. The women alone, 31 years.

Localization. The lower jaw, 42 cases. The upper jaw 36 cases. Upper and lower, 1 case. As to which side of the jaw, of 49 cases in which definite note as to this existed, 29 were of the left side, and 20 on the right.

Causation. 1. Irritation, as at bad teeth, is noted as a probable predisposing cause.

2. Lack of care of the mouth. Practically constant in the reported cases, which all came from the lower classes.

3. Tobacco has been noted by some authors. Kühner points out, however, that it is much more frequent in women, and inclines to doubt the tobacco hypothesis.

4. Pregnancy seems to have an influence.

Clinical Course. Of 54 cases, the average duration was 14.5 months.

Growth is somewhat faster in patients in the first two decades, as in older ones. In women the growth tends to be slower than in men.

In none of the cases but one was a general sarcomatosis present.

Treatment. 1. In 79 of the reported cases operation was done. Operation, excepting a few of the early cases, was radical, and included removal of part of the alveolar process.

2. Of the 90 cases, 11 have had recurrences.

3. Of the 4 non-operated cases the following is noted:

One died of general sarcomatosis. Another died in three years of the epulis, which grew constantly larger.

A third died of hemorrhage originating in the epulis.

The fourth, a boy of 5 years, had a spontaneous recovery.

Results. 77 cases of the 79 (97.47 per cent) are permanently cured. Two of these had to be operated a second time.

Kühner states, in conclusion, that epulis, when radically operated, almost always recovers. When not operated, or operated in an incomplete manner, recurrences may readily occur, and as a rule cause death.—*Über die Epulis und die Resultate ihrer Behandlung. Beiträge zur Klinischen Chirurgie*, vol. 55. W. C. DANFORTH, M. D.

THE RESULTS OF EXPERIMENTAL CANCER RESEARCH.

Joannovics considers, first, the etiological connection of the various micro-organisms heretofore described, and comes to the conclusion that all are proved to be of no causative value, with the possible exception of some recently reported spirochetes. These, he thinks, may be proven to be the cause of that group of tumors and diseases ranging from lymphosarcoma to leukemia.

In the attempt to find the cause of tumors by the study of their development and structure, he calls attention to the fact that those structures which are best able to regenerate form the most frequent constituents of tumors, and that the transition from a chronic inflammation to neoplastic growth often

occurs. In the transplantation of tumors from one animal to another (mice are generally used), it has been proven that the tumor developing often does not assume the same histological characteristics as the primary growth, and that, in fact, a pure carcinoma may, in a series of transplantations, result from a primary sarcoma, and vice versa. Cachexia and ulceration are not clinical symptoms of the mouse tumor. Another peculiarity is that the tumors of the Copenhagen breed of mice cannot be transplanted in the Berlin breed, but after the Berlin breed has lived for some time in Copenhagen, then they are susceptible to transplantation. The Berlin mice are especially susceptible to sarcoma; those in Copenhagen to carcinoma.

The resistance of one breed or kind of animal to transplantation of tumors from another leads to the assumption of an hereditary predisposition, and he calls the attention to the fact that certain races are especially subject to certain forms of tumor growth.

It has been impossible, up to the present time, to make a second transplantation of a tumor grown in an animal in which the primary transplantation had been successful. This also agrees with the fact that we practically never encounter two tumors of the same apparent age in different organs of the same individual. The susceptibility of the animals seems to increase with repeated transplantation in the same breed, but at the same time the serum contains protective bodies which are inhibitive, both to sarcoma and carcinoma, and give rise to the idea that the cause of both may be the same. It has only, so far, been possible to transplant tumors where the living cells were transplanted: all attempts to cause the formation of a new growth by the injection of the tumor serums have proved impossible.

The author agrees with Ehrlich and Apolant, that malignancy is the expression of growth energy, as is shown by the fact that a carcinoma can be reduced to an adenoma, and by the effects of physical and chemical influences. Colmheim's theory of embryonal inclusions is disproved by the discovery in cancer of a heterolytic ferment, and the existence of peculiar albumin bodies, which are not affected by pepsin, but by papayotin, trypsin, and rennet. The author thinks that chemical reaction will eventually solve the problem of tumor therapy. —*Wiener klin, Wchnschr.*, 1908, No. 1.

C. G. GRULEE.

EXPERIENCES WITH THE IODOFORM BONE-PLUG OF VON MOSETIG-MOORHOF. By Dr. Meurers, from the Louise Hospital in Aix la Chapelle.

Meurers reports 45 cases from the surgical service of Prof. Moswedel. Of these 9 were osteomyelitis, 1 bone syphilis and 35 tuberculosis. Of the tubercular cases, 14 were bone tuberculosis only, while 21 were of bone and joint tuberculosis combined.

The age of the patients ranged from 1 to 60 years, most of them being under 20.

In almost every case no toxic symptoms followed. In 2 cases only were temperature, rapid pulse, vomiting, headache and delirium noted. In these cases the following formula acted admirably as an antidote:

Ac. sulfanil.	5.0
Natr. bicarb	2.5
Ag. Dest	200.0

Tablespoonful every 1 to 2 hours.

In most cases 30 to 40 gms. of bone-plug were used, one case requiring 150 gms.

In almost all cases, iodin was detected in the urine one-half to three-fourths hours after operation. This reaction was usually found also 4 to 6 months after leaving the hospital, proving that the absorption must be a very gradual one, this deduction being also strengthened by the X-ray.

In the 9 cases of osteomyeletis, 6 successes and 3 failures are recorded.

Of the 14 cases of bone tuberculosis, 1 failure, 12 cures, of which 8 were by primary intention, 4 with some plug destruction, and 1 patient dying of some intercurrent disease.

Of 21 cases of joint and bone-tuberculosis, 15 cures (13 by primary union and 2 with some loss by plug), 5 failures, and 1 case still under treatment.

One case of syphilis of bone, cured.

Summed up, this gives 34 cures (25 by primary intention and 9 with slight loss of plug material) out of 45 cases.

It was found in general that best results followed when the bone was as much as possible surrounded by a bony wall, so as to protect the plug from trauma.

The technique as noted by Meurers does not differ from that already described in standard works. Stress is laid upon careful drying of the cavity.

His conclusions are as follows:

1. The method of Mosetig-Moorhof provides a very valuable way of quickly curing bone defects.

2. It is particularly adapted to the filling of tubercular cavities, in osteal processes, with or without synchronous joint involvement.

3. In cases of joint resection it provides a very conservative method of procedure, as it is, as a rule, sufficient to remove a thin cartilage layer, the deeper-lying lesions in the bone ends being

scraped out and plugged. Filling of the joint cavity in knee and elbow-resections is not recommended.

4. In osteomyelitic bone defects it is recommended to use the method only in the chronic stage. In cases which are still suppurating freely, open tamponade for several days of the cavity, previously carefully laid open and cleansed, is advised. —*Esfahsungen uber die Jodoform-Knockenplombe noch V. Mosetig-Moorhof. Beiträge zur Klinischen Chirurgie.* W. C. DANFORTH, M.D.

THE PERITONEUM IN ABDOMINAL SURGERY. By O. Pankow.

After exhaustively discussing the question of the care of denuded surfaces in abdominal surgery, with a number of tables and detailed reports of laboratory experiments, Pankow's conclusions are interesting. Scarification of the parietal or visceral peritoneum, without hemorrhage into the abdominal cavity, leads generally to a smooth healing over the abraided surface. Adhesions are produced only in exceptional cases, as in a unilateral superficial wound of the visceral or parietal serosa. Injury of the parietal peritoneum sufficient to produce a diffuse punctate hemorrhage, as is found essential in laparotomy work, leads comparatively often to adhesions. In experiments upon animals healthy peritoneum offered a higher protection against infection than where a simple wound had been made or where the thermo-cautery or absolute alcohol had been employed. In simple wounds, where the peritoneum was otherwise normal, infectious conditions were most unfavorable towards these animals. In infections of the abdominal cavity adhesions were the exception. In order to estimate the value of these animal experiments, as applied clinically, Pankow thinks that, where it is not possible to cover a diffusely oozing surface with peritoneum, the thermo-cautery, absolute alcohol, or perhaps other means of scarification, may be employed in order to overcome as far as possible the danger of infection and adhesion formation.— *Zur Frage der peritonealen Wundbehandlung. Monatssch. f. Geb. u. Gynäk.* bd. xxvi, heft 2, 1907. CAREY CULBERTSON.

ANURIA ASSOCIATION WITH PELVIC ABSCESS.

Von Khautz reports a case of anuria, accompanying an abscess in the pouch of Douglas, which followed an appendicitis. The abscess was opened through a rectal incision and drained. During the night following the operation, the patient passed a litre of clear, highly-concentrated urine. He regards the anuria as due to the pressure of the abscess on the ureters, and probably in part to inflammatory swelling of their walls.— *Wiener klin. Wchnschr.*, 1907, No. 50.

CONTRIBUTION TO THE SURGICAL TREATMENT OF ULCUS VENTRICULI. Nord. Med. Ark. (Northern Medical Record.) 1907 Sfd. I. No. 3. Einar Key.

The author has put on record the operations performed by professors Berg and Akerman, of Stockholm, for ulcus ventriculi, and made an after-examination of the patients operated. From 1894 to close of 1906, 177 cases were operated. During period, 1894–1900, there were 64 cases that rendered operations necessary, 69 being performed, while in 1901–1906, the corresponding figures are 113–142. Some of these operations were performed on patients from the first seven years' period, who returned owing to complications arising. Most of them had undergone very lengthy and repeated medical treatment; only in relatively few cases had surgical treatment immediately been adopted, owing to the patient having no prospect of improvement from medicinal remedies.

The mortality following an operation has decreased from 15.9 per cent during the period, 1894 to 1900, to 9.8 per cent in the years, 1901 to 1906. If the percentage be calculated per number of patients, the figures are respectively 17.5 and 12.3. All in all, 211 operations have been performed, with a mortality of 11.8 per cent. Calculated on the number of cases, the mortality is 14.1 per cent. Mortality subsequent to gastro-enterostomy has decreased from 8.8 per cent in 45 cases, in 1894 to 1900, to 1.5 per cent of 66 patients operated from 1901 to 1906.

Prior to 1901 but seven resections were undertaken, the mortality being 42.8 per cent; during 1901 to 1906, eighteen resections were performed, the mortality being 16.6 per cent.

Since 1897, every effort has been made to perform operations with the smallest possible quantity of the narcotic. Chloroform has formed the usual anæsthetic. During the actual working on the ventricle, the patient has, as a rule, been allowed to awaken, since this is not painful so long as dragging and tension can be avoided. If anæsthetist duly follows the course of the operation, and is aware which parts of the proceedings causes pain, he can give small quantities of the narcotic in proper time.

Circulus vitiosus occurred in 8 cases, in each instance subsequent to posterior gastroenterostomy, that had been performed with loops 30 to 40 centimetres in length. Deducting those cases where enteroanastomose or Y-shaped gastroenterostomy

was primarily performed, circulus vitiosus has arisen in 8 instances of the 88 posterior cases, but in no single instance of the 21 cases of anterior gastroenterostomy. In the anterior gastroenterostomies, the supplying loop was attached to the ventricle by a few sutures, which was not the case with the posterior cases. The author recommends the use of a short loop in posterior gastroenterostomy. The importance of early enteroanastomosis is strongly urged, when rinsing out the stomach is found of no avail for circulus vitiosus.

The internal incarceration of loops of the small intestine, in bursa omentalis, occurred in one case of posterior gastroenterostomy. This incarceration was obviated by a new operation. Since that time, the aperture in mesocolon transversum is carefully closed by sutures to the ventricle or intestine, when performing posterior gastroenterostomy. Contraction of the gastroenterostomic aperture has been observed in 2 cases. In these cases, the contraction was probably induced by a peptic ulcer, in or adjacent to the anastomotic edge, which had healed with shrinking cicatrization. Other reasons that might contribute to such contraction are also reported. In two cases constriction ensued in the jejunal loop used in gastroenterostomy, owing to a chronic adhesive peritonitis, that caused the formation of plications in the intestine, rendering relaparotomy necessary. In one instance, a similar alteration was observed when section was made of a case complicated in other respects. The possibility is urged that in the first two cases, one or several ulcera peptica jejuni caused the chronic peritonitis. Subsequent to the healing of the wound, the adherences have shrunk and caused the plication of the intestine. No fewer than 5 cases of ulcus peptic. jejuni have been operated. In two instances, however, the first gastroenterostomy was performed at another hospital. Detailed accounts of these cases as also of the epicrises, are given. Moreover, an interesting case of ulcus peptic. jejuni, operated upon by Professor Lennander, subsequent to an operation (Billroth II) for cancer ventriculi, is described. From medical literature, the author has collected 49 cases of ulcus peptic. jejuni, and gives an account of the occurrence and prevalence of this disease. It is remarkable that in those cases where the ulcer has appeared at the earliest period, it has been localized to the jejunum. It would have appeared far more likely that the earlier ulceration would arise in the suture itself. It is probable that in some instances, when peptic ulcers have occurred immediately after the operation, at the point of anastomosis, the complication arising has been deemed due to faulty suture.

Tiegel's division of cases of ulcus peptic. jejuni into but two groups, either as those of completely devoid of symptoms, that later perforate the abdominal cavity, or as those that run a chronic course, forming adherences and ulcerous tumours, will not bear scrutiny. In some cases, where perforation has occured into the free abdominal cavity, stomachic troubles have previously been present for some time. It is, moreover, very probable that many such ulcers cause no appreciable symptoms, or give no pain; heal, and thus are never subjected to diagnosis. There are also ulcers that cause some stomachic pain, but never perforate, though occasioning an adhesive peritonitis. Subsequently, by its shrinking, it may cause stenos of the gastroenterostomic aperture, or plication of the jejunal loops.

Ulcus peptic. jejuni chiefly occurs in cases where gastroenterostomy has been performed for non-malignant gastric troubles, but may follow an operation for cancer. Anterior gastroenterostomy seems to predispose for ulcus peptic. jejuni far more than the posterior. Whether the Y-shaped gastroenterostomy or enteroanastomosis increases the risk, as regards the occurrence of ulcus peptic. jejuni, cannot at present be decided. Gastroenterotomia fundosa is not an absolute preventive against ulcus peptic. jejuni. As regards adherences around the place of gastroenterostomy, loosening them should not be deemed sufficient, but attempts should be made to discover whether they be caused or complicated by ulcus peptic. jejuni, in which case the latter must be attacked. In order to provide against ulcus peptic. jejuni, it is necessary to proceed with the operation so cautiously that the vitality and resisting power of the tissue be depressed in smallest degree compatible with the operation, after which the patient should be subjected to strict medical dietetic treatment; be kept under observation for some time, and receive skilful care, should pains recur.

When judging the methods practised by the various operators, the author lays special stress on particular attention being paid, not only to the pathological anatomical character of the ulcer, but also to its localization, complications, and patient's state consequent on the operation. In accordance with these views, the author has distributed his cases in various groups, in each group studying not only the risk of the various methods of operating, but also the primary effect and more remote results. First are discussed the operations for stenosis in the pylorus, after the ulcus is healed, and for ulcus pyloris. Experience is not favorable

as regards pyloroplasty. As a rule, it is stated that the immediate effect of this operation is satisfactory, but a relapse often occurs later on. In most cases, in the aforesaid casualty record, the immediate result of the operation has not been satisfactory. The question of resection, or gastroenterostomy, is intimately connected with the question of secondary cancerous formations in ulcus, ventriculi or ulcus cicatrices, since this danger is one of the most important reasons for a radical procedure. The author reviews the different opinions concerning cancerous degeneration of ulcer of the stomach, declaring that further investigations are necessary for the elucidation of this question. Ulcus and cicatrices, in or close to the pylorus, mostly predispose for secondary cancer, in consequence of the irritation of the contents of the ventricle being greatest just here. Ulcus and cicatrices, that are in or close to the stenosis of the "hour-glass stomach" appear to be on a par in this respect. When operating, we cannot invariably decide whether there is a malignant degeneration. Secondary cancer can arise in an ulcer or cicatrice in spite of palliative operation. Statements concerning the frequency of secondary cancer vary very considerably. At present, it cannot be determined, with any certainty, by which operation — gastroenterostomy or resection — we may save most patients in the long run. However, it does seem that the increased risk of pylorus resection, in comparison to gastroenterostomy, in general, would be counterbalanced by the greater prospect of the patient escaping secondary cancer. Resection is, however, not justifiable when but the slightest doubt is felt as to whether the patient can stand the far more debilitating resection. If cancerous degeneration be suspected, resection ought naturally to follow, if the tumor can be resected, and the patient be deemed likely to recover. Should there be an ulcerous tumour, as a rule, the operation should be limited to gastroenterostomy, eventually combined with exclusio pylori. For ulcers or cicatrices in the ventricle, close to the pylorus, the same indications hold good.

By investigations, carried on with the aid of Röentgen Rays, about the effect of the various operative methods on the voiding of the ventricle in unchanged pylorus, or stenosis of the pylorus, as also in differing form and position of the ventricle, in combination with investigations of the conversion of matter and the secretions of the gastric juice, we ought to obtain new and important facts by which we can judge the value of the various methods of operation.

In those ulcers that are cardially situated, as regards the pylorus, and are non-penetrating, with simultaneous motorial insufficiency, gastroenterostomy is advanced as the chief method. The danger of secondary cancerous formations in these ulcers appears to be less than in those in or near the pylorus, thus forming a less weighty reason for resection. As a matter of course, should there be the slightest suspicion of cancer, resection should be performed, in case the tumor can be operated, and the patient's strength justifies the operation. If the ulcers be on the anterior wall they appear to predispose to perforation, and should be extirpated where such excision be possible. With those ulcers that are cardially situated, as regards the pylorus, and accompanied with motorial insufficiency, there is far more prospect of a palliative operation conducing to the healing of the ulcer, than if the ventricle can be voided normally. Owing to the uncertain effect of the palliative operations in these cases, the indications for resection should be made rather more ample than in the cases of open ulcers, where motorial insufficiency is also experienced. For those callous ulcers penetrating the anterior wall of the abdomen resection must be deemed the normal method. Should resection be impossible, or the patient be considered unable to stand so trying an operation, then gastroenterostomy should be performed, being then combined with jejunostomy. With regard to the ulcers penetrating the pancreas or liver, it is pointed out that there is, as yet, an insufficient number of any large series of closely studied cases that have been studied for any length of time, so that no decision can be definitely made concerning the value of the various methods of operating. It seems, however, that preference should be given to gastroenterostomy, in consequence of experience hitherto obtained, especially in those cases that are combined with retention. In bad cases, this operation might be combined with jejunostomy. For "hour-glass" stomach, with short stenosis and normal ventricle wall, there may be a question of gastroplastics. If the stenosis be long and constricted, or should there be adhesive peritonitis around it, then indications point to gastroanastomosis. If, simultaneously, pylorus stenosis, or great dilation of the pylorus part, occur, one of these operations should be combined with gastroenterostomy (or possibly pyloroplastics or plyorostomy). In cases of dilation of the cardiac portion, either gastroanastomosis or gastroenterostomy of the cardiac portion should be performed. Open ulcers should be operated by gastroenterostomy on the cardiac portions, or by gastroanastomosis in combination with gastroenterostomy, preferably of the cardiac portions.

In suitable cases resection may be performed. If there be any suspicion of malign degeneration of the ulcer, resection should, if possible, be undertaken. For duodenal ulcers, gastroenterostomy is advocated, combined with exclusio pylori. If the ulcers have attacked the pylorus, and still more so if they extend to antrum pylori, then owing to the risk of secondary cancerous degeneration, there are the same indicants for resection as in primary ulcer in the pylorus or antrum pylori.

By localized adherences, gastrolysis is indicated. In such cases, a gastroenterostomy should also be performed, as there is danger of adherences again forming. In those cases where they fix the pylorus, or upper part of the duodenum, to the liver, simple gastroenterostomy is often of good effect. Even should lysis be performed in these cases, yet gastroenterostomy should follow, since the adherences easily form again. With extended adherences, the prognosis for gastrolysis is not favorable. Should the adherences hinder the due evacuation of the ventricle, there seems every prospect of a satisfactory result being obtained by gastroenterostomy. Where possible, gastrolysis should be combined with gastroenterostomy.

In cases of perforation peritonitis, the first consideration must invariably be to conquer the peritonitis, and the operation be performed as quickly as possible on the usually sadly debilitated patient. If the sore can stand direct suture, this should, as a rule, be performed, in preference to excision, which complicates the operation. Should no stenos be found, and no constriction arise from the sewing together of the wound, it is better not to perform gastroenterostomy, in order that the operation may not be unduly lengthened. Jejunostomy appears to be more called for in these cases. A secondary gastroenterostomy is not invariably necessary. In five cases, after careful and systematic flushing of the abdominal cavity with a saline solution, from a median incision, after due suture of the aperture of perforation, the abdominal cavity was closed with the exception of a small gauze packing, towards the ventricle suture. To state a certain maximal time, within which the abdominal cavity can be completely closed, is utterly impossible, since the malignancy of the peritonitis does not solely depend on the lapse of time between the perforation and the operation. It is safest to place a packing towards the ventricle ulcer, especially if excision be not performed.

The author reminds us that the medical and surgical treatment ought not to be two methods that compete with each other, but that they should supplement each other in such manner that surgical treatment was employed when medical treatment appeared hopeless in those cases from the very beginning, or had proved unable to attain its aim. He, moreover, lays stress on ulcers in or adjacent to the pylorus, as also ulcers in the duodenum, needing wider indicants for operation than other localization of ulcers in the ventricle. Should there be symptoms of an open ulcer, with retention, operative measures should be adopted far sooner than when no such symptoms are discoverable.

SUBCUTANEOUS MUSCLE-RUPTURE AND ITS OPERATIVE TREATMENT. By Dr. W. Wolf, from the Leipzig Surgical Clinic — Prof. Trendelenburg, Director.

Wolf reports four cases of muscular rupture seen in the Leipzig clinic and collects 20 cases from the literature. Three of the reported cases were of the biceps and one of the quadriceps femoris.

Etiology.— 1. Type of force. The great majority of cases follow indirect violence, as, a severe muscular effort.

2. Muscular men are most often affected. But two cases have ever been reported in women. In one of these a tumor of the upper arm had previously been removed.

3. Previous diseases. Acute infections, such as typhoid, variola, scarlatina, miliary tuberculosis, syphilis, and alcoholism seem to play a part.

Diagnosis — When no great effusion of blood is present, usually not difficult.

1. Loss of function. In some cases of biceps rupture it is not particularly marked.

2. Deformity. In the muscle belly, the ruptured ends may stand out and leave a hollow between them. On the other hand, near the tendon, the torn muscle may stand out as a more or less spherical tumor mass.

3. In some cases a hematoma may so mask the deformity that it is not noticeable, and the injury may be taken for a simple contusion.

Location — 1. Biceps. The long head of the biceps is much more frequently injured than the short. In one reported case both heads were torn.

2. Quadriceps. Of 64 cases from the literature, 34 were pure tendon ruptures; 8 were pure muscular ruptures.

Treatment. These cases were all formerly treated conservatively, fixation in the flexed position, pressure by adhesive plaster and bandages; later, massage, electricity action and passive motion.

2. Wolf is of the opinion that an attempt should in most cases be made to unite the torn surfaces by suture. Of the 20 quoted cases, 13 were oper-

atively treated, with good results. Of the 4 cases from his own clinic, 2 were operated, the result in both operated cases being extremely good. — *Zur Kenutnis der Subkutanen Muskelruptur und ihres Operativen Behandlung. Beitrage zur Klinischen Chirurgie.* Vol. 55.

W. C. DANFORTH, M. D.

THE DIAGNOSIS OF ARTERIAL CLOSURE IN GANGRENE OF THE FOOT. By A. Moszkowicz.

There is a great difference of opinion among surgeons to-day as regards the site of election for amputation in gangrene of the lower extremity. Some advocate amputation through the thigh, whereas others recommend merely the removal of the foot. This difference of opinion is due to the fact that we possess no means of establishing at what level the vessels of the leg are in a healthy state. In order to determine the state of the vessels, Moszkowicz recommends that the affected leg be rendered bloodless by means of an Esmarch bandage, and that the bandage then be suddenly removed. In a healthy leg sudden removal of this sort is followed by an active red hyperemia extending to the tip of the toes, whereas, if the vessels are diseased, the hyperemia occurs more slowly and usually extends only as far as that point where the vessels are in good condition. Moszkowicz quotes three cases in which amputated legs were studied with the result that the preoperative diagnosis was absolutely confirmed, the point of obstruction being found to exist at that spot beyond which no hyperemia occurred after the release of the Esmarch.—*Mitt. a. d. Grenz. d. Med. u. Chir.*, b. xvii, h. 1 and 2.

M. G. SEELIG, M.D.

TRANSPLANTATION OF FRESH KIDNEY TISSUE. By H. V. Haberer.

In this extensive piece of work, done at the suggestion of Prof. von Eiselsberg, Haberer has made use of over thirty-five animals, in each case transplanting a portion of freshly removed kidney-parenchyma into the liver, spleen or omentum. As a result of these various experiments Haberer found that when kidney tissue is transplanted in spleen, omentum or liver, it heals in situ without any reactionary inflammation. After a time, however, the transplanted pieces undergo necrosis, are absorbed and supplanted by scar tissue. During this time, however, a portion of the transplanted tissue may show reparative phenomena, as manifested by nuclear division. The kidney function of the animal is in no way influenced by the transplantation.— *Arch. f. Chir.*, b. lxxxiv, h. 1.

M. G. SEELIG, M.D.

INTRAPERITONEAL INJECTION OF OXYGEN FOR TUBERCULOUS ASCITES. By Karl Schulze.

Schulze recommends that in cases of ascites due to peritoneal tuberculosis the ascitic fluid be evacuated through a trocar, and that oxygen gas be led into the peritoneal cavity through this same trocar. Enough oxygen is allowed to enter the abdomen to distend it to the same degree that it was distended by the fluid previously removed. As a general rule this means the admission of about 1,500 ccm. of the gas. Patients undergo the procedure uncomplainingly, and aside from an occasional vomiting spell no untoward symptoms were noticed. Of course there is always a more or less well developed meteorismus, but this seldom lasts longer than eight to ten hours. The temperature curve is not noticeably influenced. A short while after the injection the ascitic fluid begins to be absorbed, and only occasionally (once in seven cases) is a repetition of the injection necessary. The results so far are highly satisfactory, although the number of cases treated up to the present is small.—*Mitt. a. d. Grenz. d. Med. u. Chir.*, b. xviii, h. 1.

M. G. SEELIG, M.D.

FURTHER EXPERIENCES WITH PHYSOSTIGMIN INJECTED SUBCUTANEOUSLY TO STIMULATE PERISTALSIS. By Vogel.

One of the most powerful aids in preventing peritoneal adhesions after laparotomy is the early stimulation of peristalsis. As a rule the ordinary cathartics fail to do this, owing to the fact that they cause vomiting when administered soon after an anæsthetic. For this reason it is very desirable that some drug should be used that can be administered subcutaneously. Vogel has used physostigmin in a large number of cases immediately after operation, and since using the drug has not encountered a case of post-operative ileus. He cites in particular three cases in which conditions were such that there was every reason to expect post-operative ileus, in which cases, however, the post-operative course was uneventful. The drug has served excellently in quite a number of cases of meteorism following contusions of the trunk. Vogel quotes six such cases. The drug is administered in a 1 mg. dose, followed after an hour by a glycerin enema. After five or six hours both the physostigmin and the enema may be repeated. The author warns very distinctly against too severe and too prolonged catharsis before operation. He believes merely in the administration of a dose of castor oil one or two days preceding the operation.— *Mitt. a. d. Grenz. d. Med. u. Chir.*, b. xvii, h. 5.

M. G. SEELIG, M.D.

THE SPONTANEOUS HERNIAS OF THE LINEA SEMILUNARIS. By L. Thévenot and Gabourd.

The term ventral hernia is too comprehensive. It lacks definiteness. Hernias which formerly were discussed as ventral hernias are now being discussed under separate headings, viz: Hernias of the linea alba, of the linea semilunaris, etc. Under the title of hernia of the linea semilunaris are designated all hernias that escape through aponeurotic space extending between the outer border of the rectus abdominalis and the line of insertion of the muscular fibers of the transversalis. Some of these ventral hernias are traumatic. As examples of these may be mentioned hernias following perforating wounds of the abdomen, operative wounds of the abdominal wall inflicted for the removal of the appendix, for the draining of a deep abscess, for the ablation of a parietal lipoma. Other hernias are spontaneous in origin. Unlike the former, their site is constant. Hernias of the spontaneous type are the only ones that are considered in this article.

Klinklosch, in 1764, first described hernias of the linea semilunaris, Cooper in 1837 reported 3 cases. He was the first to call attention to the fact that numerous small vessels pass through the abdominal wall in this region, and that the muscular fibers may be somewhat separated around these vessels so that the gap in the wall is already formed.

Etiology. All causes susceptible of producing hernia elsewhere can produce it in this location. These hernias have a constant seat, which is external to the outer border of the rectus, on an imaginary line extending from the umbilicus to the anterior superior spine. The constancy of their seat suggests an anatomic predisposition.

The authors examined the abdominal wall of 10 cadavers so as to determine the exact course of the deep epigastric artery. The distribution of this artery is of two types. In the first type, which is the more frequent, the artery curves upwards and inwards, to about the middle of the posterior surface of the rectus, behind which surface it courses upwards. The less common type was found four times. In these cases, the artery near the semilunar fold of Douglas, courses along the outer border of the rectus. It gives off a perforating branch below the semilunar fold of Douglas. This branch is constant and perforates the aponeurosis, the linea semilunaris principally, creating an orifice which under normal conditions may have a diameter of 4 mm. This orifice is situated upon a line extending from the umbilicus to the anterior superior iliac spine, immediately external to the rectus abdominalis muscle, at the point where, clinically, we find hernias of the linea semilunaris.

These hernias may be congenital. Among other causes may be mentioned adiposity, pregnancy (almost all the cases of hernias of linea semilunaris reported have occurred in women), abdominal tumors, ascites, phlegmon of the abdominal wall, congenital weakness of the tissues, properitoneal lipomata.

Pathology. The volume of these hernias is variable. Their number varies. Usually, they are single. They may exist with other types of hernia. Their seat is constant, being found at that point of the linea semilunaris where it is crossed by a line extending from the umbilicus to the anterior superior spine of the ilium. The ring is formed by the aponeurosis of the internal oblique and the transversalis muscles. The hernia may be simple, properitoneal or interstitial. A hernial sac is always present. The contents may be caecum, colon, small intestines, epiploön, etc. The contents may be free in the sac, may become adherent to it. The hernia may become irreducible, inflamed, obstructed, strangulated. Gut may be kinked, twisted, compressed by bands.

Diagnosis. Vague dyspeptic symptoms; a mass may be palpable. Reduction is not always associated with gurgling. Often the hernia is found only at autopsy-table. The location of the hernia helps to make a precise diagnosis. Enterocolitis, cholecystitis, appendicitis, and sigmoiditis must be excluded.

In young patients a radical cure is imperative. The ring, when not large, is easily obliterated. In some cases, the obliteration of the ring is very difficult. Recurrences occur. In old, obese individuals with myocarditis and chronic bronchitis, in absence of marked pains, in absence of irreducibility and strangulation, it is better not to operate and to be satisfied with the wearing of a truss. Cases are reported in detail,— *Les Hernies Spontanèes du repli semi-lunaire de Spiegel. Revue de Chirurgie*, Paris, vol. xxvii, No. IV, 1907.

AIMÉ PAUL HEINECK.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF OBSTETRICS

UNDER THE CHARGE OF

C. S. Bacon, M. D. — Rudolph W. Holmes, M. D.
C. v. Bachellé, M. D. — Hugo Ehrenfest, M. D.

Compression of the Aorta for Post-partum Hemorrhage. By F. Percy Elliott.

Elliott reports the case of a tertipara, aged 22, whose previous pregnancies had been normal, except that her last child was still-born, evidently due to the cord being about the neck. In the labor here reported the pains were preceded by a sharp uterine hemorrhage. Examination revealed the lower margin of the placenta overlapping the internal os; the position of the fœtus was normal, and the mother's general condition good. The pains at first were feeble and irregular, but later became stronger and frequent. By this time, with three fingers dilatation, the hemorrhage became profuse. Delivery was now effected by version and a sharp hemorrhage followed the extraction of the child; the uterus showed inertia and the pulse rose to 140. Manual compression of the aorta stopped the bleeding and the third stage was terminated without difficulty. The woman now was faint, cold and pale, pulse 140 to 150. Under treatment she rallied for a few hours, but again bleeding set in with a return of the inertia, and she showed collapse. The uterus was emptied of blood-clots and again expression of the aorta was resorted to. Normal saline was given subcutaneously, the legs were bandaged and elevated, and ernutin administered hypodermatically. For five hours direct pressure on the aorta was maintained by Elliott and his assistant and the hemorrhage absolutely controlled. The patient, who had been unconscious, now recovered sufficiently to take nourishment. The pulse gradually fell to 100 and was of good character. The bandages were removed and her condition became quite satisfactory. During the following night, however, she was permitted to leave the bed for some water on a near-by table, fell in a collapsed state on the floor, and soon expired from heart failure.

Despite the fatal termination, Elliott regards this case as a good illustration of the great value of compression of the aorto. Bleeding had ceased for nearly fourteen hours before the patient died, and no further hemorrhage occurred at the time of death.— *Bristol Med. Chirur. Jour.*, June, 1907. Abstract from *Jour. Obst. and Gyn. of the Brit. Emp.*, vol. xii, No. 3, Sept., 1907.

Carey Culbertson.

Vaginal Cæsarean Section. By H. Rotter.

The writer reports four cases from the clinic of von Elischer, Budapest. In two cases the indication was an uncompensated mitral insufficiency, and in two, eclampsia. Albuminuria was also present in the first heart case. Both eclamptics were in coma and showed albuminuria. In the first heart case both mother and babe were lost, but all the rest lived. All four women were at term and in labor. Vaginal section was preferred as being the most rapid method of performing accouchement forcé. Rotter would confine this operation to cases where the child was living or viable, and where labor had not begun or was early in the first stage. In various case-reports he has found the operation performed for the following indications, certain of which he questions forcibly:

1. Rigidity of the cervix, as that due to ulcers or operations.
2. Carcinoma cervicis.
3. Eclampsia.
4. Vitium cordis, as in failure in compensation in valvular lesions.
5. Pulmonary tuberculosis, in an advanced stage.
6. Premature detachment of the normally implanted placenta.
7. Placenta prævia.
8. Artificial induction of premature labor.
9. Chorea.
10. Hyperemisis gravidarum.
11. Septic fever during labor.
12. Prolapse of the umbilical cord, except in contracted pelvis.
13. In prophylactic version.
14. In the moribund and dead.

Five cases of vaginal Cæsarean section were reported at the same time by Béla Nádory, also of Budapest. Three of these were for carcinoma of the cervix, in all of which the mothers and babes survived the operation, though one woman died two months later. Eclampsia was the indication in the other two cases, and here the mother was lost in the first case and the child in the second. Case Reports.— *Zentrbl. f. Gynäk.* No. 39, 1907.

FATTY DEGENERATION OF THE UTERUS IN PREGNANCY. By Marius Ciulla.

Ciulla has studied the uterine changes due to pregnancy in Bossi's clinic at Genoa, and reaches important conclusions. He finds that in the last two months of pregnancy a true fatty degeneration exists in the uterus, which involves only the hyperplastic muscle fibres. These fibres are first destroyed and then a fatty infiltration of the hypertrophic fibres occurs, so that in this way they become reduced in volume and take on their normal morphology. At the end of pregnancy this fatty degeneration has a restraining effect on the marked irritability of the uterus, and hence, in case of excessive degeneration, a primary and essential inactivity of the uterus at this time may be explained. With a decreasing or absent degeneration, on the other hand, we observe those cases of marked contractions, particularly during labor. In like manner subinvolution and hyperinvolution in the puerperium may be explained.

In prolonged pregnancy, therefore, we may recognize an excessive or premature degeneration as the etiologic factor, just as its entire absence may lead to abortion. The author also believes from his study that, carried by the maternal blood, fat from this change in the smooth muscle fibres of the pregnant uterus may add directly to the development of the fœtus during the last two months of gestation. This is the first reserve force upon which the child may draw, the functionating breast being the second. Finally, Ciulla thinks that fat, produced in the puerperium by the active process of involution, assists materially in the secretion of milk.— *Über die fettige degeneration der Gebärmutter bei Schwangerschaft. Zentrbl. f. Gynäk.*, No. 37, 1907.

CAREY CULBERTSON.

THE PATHOLOGY OF PERITONITIS. By E. Heller.

Heller's contribution is a general review of new experimental research in the pathology of acute peritonitis. He considers the means by which resorption takes place in the abdominal cavity, and the occurrence of resorption and transudation in the normal and diseased peritoneum. Bacterial resorption in peritonitis and peritoneal resistance to infection are referred to, as well as a brief mention of therapeutic experiments. As regards the causes of death in peritonitis he quotes from Heinecke.

1. The cause of death in perforation peritonitis in the rabbit is a paralysis of the center in the medulla oblongata.

2. This extends in first degree to the vasomotor center; in second degree, to the respiratory center.

3. The circulation shows a marked disturbance earlier than the respiration, but the latter yields before the former.

4. Paralysis of the vasomotor center is the cause of the circulatory disturbance; this ranks first in the clinical signs.

5. The heart takes no part in this condition of the circulatory disturbance.

6. The degree of circulatory disturbance in peritonitis is exactly in proportion to the severity of the infection.

7. The paralysis of the nerve centers is the result of the entrance into the blood stream of bacterial products from the peritoneum.

In quoting from Danielsen's recent work on this subject, the writer brings out the following deductions:

1. Bacteria are carried from the abdominal cavity by the lymph streams and not by the circulation.

2. By the introduction of oil into the stomach, for the purpose of flooding the lymph channels, it is possible to check bacterial resorption. This is in line with Glimm's investigation.

3. The application of cold in delaying resorption is found to have no substantial effect, while that of heat, in order to hasten resorption by active hyperæmia, possesses an unfavorable influence on the course of the infection.

4. Attempts to explain this difference in resorption from the abdomnial cavity show that colloids are taken up by the lymph vessels and crystalloids through the blood stream.— *Bericht über neuere experimentälle Forschungen zur Pathologie der akuten Peritonitis. Monatsschr. f. Geburt. u. Gynäk.* bd. xxvi, heft 3, 1907.

CAREY CULBERTSON.

THE FUNCTION OF THE MAMMARY GLAND. By H. Cramer.

The author of this article sums up the results of his observations in a single paragraph as follows:

The development of the female mammary gland depends directly upon the function of the ovary.

Physiologic and pathologic stimulation in the ovary and sexual apparatus results in a similar stimulation in the breast. As for the function of the gland, the secretion of milk, pregnancy is a preliminary condition, but the two need not necessarily be produced consecutively. Even as early as the first month this stimulation of secretion may be lost by abortion. In the last month of pregnancy there arises a check to the stimulation which continues in force until the labor is over. Then cessation of fœtal metabolism and evacuation of the uterus give the necessary impulse to secretory activity. Lactation may persist for several years, and the longer it is maintained after labor the more satisfactorily is the function of the gland brought into service again. The secretory activity is entirely independent of the ovary. Marked psychic influence may produce a primary disturbance of the breast function, shown suddenly in a considerable diminution of the secretion. This disturbance may be overcome, in turn, by putting the child to the breast.— *Einige Beobactungen über die Funktion der weiblichen Brustdrüse. Monatssch. f. Geb. u. Gynäk.* bd. xxvi, heft 3, 1907.

CAREY CULBERTSON.

CASE REPORT

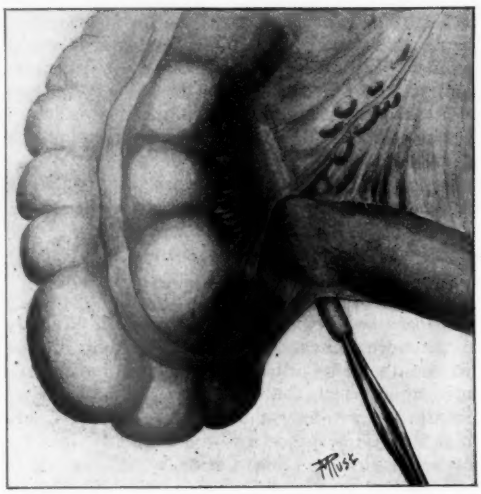
A REPORT OF A CASE IN WHICH THE APPENDIX HAD ITS ORIGIN IN THE POSTERIOR WALL OF THE CÆCUM SEVERAL INCHES ABOVE THE ILIOCÆCAL JUNCTION

BY GASTON TORRANCE, M. D.
Surgeon to St. Vincent's and The Hillman Hospitals, Birmingham, Alabama

The patient, a farmer, 57 years of age, was referred to me by Dr. H. T. McGehee of Morris, Ala., on June 25, 1907, with the following history: During the past three years he has had five attacks of appendicitis, as a rule he was confined to bed for two or three days each time and would be relieved of all symptoms as soon as his bowels were freely moved.

The patient had the typical symptons of appendicitis except that there was also a decided tenderness over the region of the gall-bladder.

Under ether an incision was made through the rectus muscle, so that it could be enlarged upward in case the gall-bladder proved to be involved. The cæcum was delivered without difficulty, but there was no evidence of an appendix or abscess behind it or anywhere in the neighborhood. I enlarged the incision downward, and only after sweeping my finger around the brim of the pelvis a number of times did I accidentally find a small tip of the appendix hanging over the brim near the rectum; when brought up and pulled upon, it was found to make a ridge in the mesentery of the ilium leading to a point several inches above the iliocæcal junction, and that it would be impossible to remove the whole appendix without making an incision through the mesentery, and as the tip was almost in a gangrenous condition this was deemed unwise. While an assistant held the ilium up as high as possible and made traction upon the appendix, I ligated it and the mesappendix with a heavy chromic catgut ligature and amputated, making no attempt to invert the stump.



Drawing showing relations of the appendix.

A small Mikulicz drain was passed down to the stump and allowed to remain for several days. This healed up promptly. The patient is reported to be in perfect health four months after operation.

BOOK REVIEWS

PROGRESSIVE MEDICINE. Edited by Hobart Amory Hare and H. R. M. Landis. Philadelphia and New York: Lea Brothers & Co.

This volume of Progressive Medicine consists of a review of the Diseases of the Thorax and Viscera, by William Ewart; Dermatology and Syphilis, by William S. Gottheil; Obstetrics, by Edward P. Davis; and Diseases of the Nervous System, by William G. Spiller.

These well-known authors have reviewed the literature carefully, and those who are interested in these practical branches will find that the material which has appeared in the last few months previous to its appearance has been well covered by the contributors. The part by Davis is particularly extensive and satisfactory; the name of Spiller is sufficient guarantee as to the character of work done in his section.

NIERENDIAGNOSTIK UND NIERENCHIRURGIE. By G. Kapsammer. Two volumes. Vienna and Leipzig: Wilhelm Braumüller.

It is seldom that the reviewer of a book has so few chances for criticism as has one who studies Kapsammer's book with care. Prepared in a most excellent manner by Braumüller, as far as typographical work is concerned, he has brought forth two volumes, approximating in all 1000 pages, which cover the entire subject of surgery and diagnosis of kidney lesions in a most satisfactory manner. His investigations of the literature, re-enforced by his own extensive experience, make the book one which should appeal to every physician having to deal with these lesions as being by far the most complete, satisfactory, and up-to-date book which we have upon the subject.

The first volume takes up in an extensive manner the various methods of diagnosis and technical procedure. After the older methods of investigation of the urinary secretion have been covered, cryoscopy is discussed extensively and his technique described. Electric conductivity is given a brief review, while the methods of investigation by the introduction of methylene blue, indigocarmine, phloridzin, and other materials, are discussed extensively and satisfactorily.

The method of collecting the urine from either or both kidneys is considered and the various older methods, such as the Luys and Harris segregators, are discussed, but the greatest space, of course, is allotted to catheterization of the ureters.

The book is particularly valuable on account of the extensive bibliography which accompanies the first volume.

The second volume discusses more particularly surgical phases. Tuberculosis of the kidney has received a proper share, 188 pages being given to this question, which includes, of course, case reports. The tumors of the kidneys, with the exception of hypernephroma, might have received more extensive consideration. The discussion of renal hæmaturia, however, is well worthy of the author. The chapters on nephrolithiasis which are accompanied by numerous case reports, and those upon pyonephrosis and pyelitis, are excellent. The surgery of the ureter does not receive the consideration that one might wish for.

Taken as a whole, the two volumes will be welcomed by the American public with pleasure and satisfaction, as a most valuable contribution to the subject of kidney surgery.

DISEASES OF THE SKIN. Fifth edition. Henry W. Stelwagen. Philadelphia: W. B. Saunders Company.

The fifth edition of Stelwagen's classical work on Diseases of the Skin contains considerable new matter, while retaining all the previous well-known commendatory features.

The main subject-matter bears much evidence of careful revision. Among many new minor points, the relation of the spirochæta pallida to syphilis receives judicial recognition.

Much of the new material introduced is concerned with certain tropical diseases — frambesia, verruga pernana, and tinea imbricata, — which, always fascinating, have acquired new interest from our closer relations with tropical countries.

The method of classification — modified from that of Hebra — might, we think, receive further modification with advantage in some slight respects.

We would like, for example, to see the "infectious granulomata" removed from the class of new growths. This is a minor point, however. No scheme of classification, yet devised, can, at present, be entirely satisfactory.

The wealth of photographs, half-tones and colored plates — over three hundred in number —

constitute, from an artistic standpoint alone, a most pleasing feature of the work.

The value of good illustrations of dermatological cases is, to the student, inestimable, and in this work a wise and happy choice has been shown in their selection.

The introduction of many good drawings of pathological sections of various skin diseases is an excellent and valuable feature.

In the text, this work compares most favorably with any dermatology of which we have knowledge. It is written in a broad and scholarly spirit which only an exhaustive knowledge of the subject, coupled with wide practical experience, can bestow.

The many references to current literature is not the least valuable feature. Treatment is considered in great detail and not from the standpoint of the set prescription, but with a broad view of the underlying principles.

One who desires a complete, helpful, and most judicial exposition of dermatology as it is to-day will find that this classical work leaves little to be desired.

THE TREATMENT OF FRACTURES. By Charles Locke Scudder, M.D., Surgeon to the Massachusetts General Hospital; Lecturer on Surgery in the Harvard University Medical School. Sixth edition, thoroughly revised and enlarged, with 856 illustrations. Philadelphia and London: W. B. Saunders Company. 1907.

This sixth edition of Scudder's most excellent treatise upon fractures is a volume of over 600 pages, profusely illustrated, with 856 photographs of pathological conditions and methods of treatment. There has been a very commendable increase in the successive editions in the amount of space devoted to methods of technique in the treatment of fractures. In the present edition, the author has added the later bibliography, and has amplified many of the chapters. Especially has he discussed the remote results following trauma of the head and those skull fractures occurring in the new-born. Additions have been made in the discussion of fractures of zygoma, of the malar bone, of the superior maxilla, of the head and neck of the radius, of the neck of the femur, and of the carpal scaphoid. In relation to this latter, however, he unfortunately does not lay stress upon the fact that we frequently find the scaphoid divided normally. This is particularly unfortunate, in that he leans to radical treatment of these cases, rather than more conservative methods, which most surgeons find satisfactory.

He has also discussed, more completely than in previous editions, unreduced dislocations of the elbow, dislocation of the acromio-clavicular joint, pathological fractures, old fractures of the radius, and Volkmann's contracture. The consideration of this latter subject is particularly praiseworthy, since the possibilities of injury following splints is not so widely appreciated by the general profession as it should be.

One cannot but hesitate to offer any suggestions for improvement, in a book which is such a credit to the profession. However, more extensive discussion might have been given to longitudinal fracture of the elbow, involving the ankle joint, and the open treatment of fractures.

The chapter by Codman, upon the use of Röntgen rays in the treatment of fractures, is an excellent idea, but one that might be amplified, particularly in the discussion as to the methods of securing good photographs of various bones of the body, considered in detail, and also as to the deductions to be made upon photographs which are secured, and upon the conservative treatment in cases of apparent improper reduction.

The chapter upon the employment of plaster of Paris in the various parts of the body, and the ambulatory treatment of fractures, are well conceived and carried out. The bibliography is especially valuable to the surgeon.

The publishers have produced a volume that, in every sense, is a credit, and both they and the author should be congratulated.

HOSPITAL TRAINING SCHOOL METHODS AND THE HEAD NURSE. This work will supply a much felt need for those who are responsible for the teaching and training of pupil nurses.

The author calls attention to the essentials to be kept in mind in selecting nurses; then outlines a course for their theoretical and practical work, pointing out present day evils to be found in many schools, in regard to teaching theory, that is non-essential at the sacrifice of the essential. The chapters on Dietetics and Anatomy deal especially with this. She emphasizes the necessity of demonstrating, as far as possible, all theoretical work.

To have well-trained nurses, we must provide suitable instructors: chief among these is the head nurse. The latter part of the book is devoted to her, her qualifications, duties, and responsibilities being clearly and concisely defined.

A VERY YOUNG OVUM IN SITU. By Prof. G. Leopold, Geheimer Medizinalrat, Director of the Royal Gynæcologic Clinic and School for Midwifery, Dresden. Member of the Royal Medical Board of Dresden. Comprising the Fourth Vol-

ume of the "Arbeiten aus der Frauen-Klinik in Dresden." Authorized English Translation. By W. H. Vogt, M. D., Gynæcologist and Obstetrician to the Lutheran Hospital, St. Louis, Mo. 70 pages, with 16 lithographic plates. Price, $3.50. St. Louis: C. V. Mosby Company, 1907.

This volume is a translation of the monograph describing Leopold's ovum that was published in 1906. While the original publication has already been studied by specialists interested in this particular line of research, it is undoubtedly of a certain value to have a competent translation. This Dr. Vogt has accomplished in the present work, thus bringing so important a part of Leopold's studies within the range of the general practitioner's observation. Whether this will be of essential use to the latter is, of course, another question. The translation is altogether adequate, and represents the original excellently. Particularly is this true of the plates, which are furnished by the original publisher. The only defects consist in an occasional error in proof-reading and the use of a German word or phrase, which, if not capable of translation, should be explained.

CAREY CULBERTSON.

A CLINICAL ATLAS — VARIATIONS OF THE BONES OF THE HANDS AND FEET. By Thomas Dwight, M. D., LL. D., Parkman Professor of Anatomy at the Harvard Medical School. Philadelphia and London: J. B. Lippincott Co.

This is an excellent treatise which will be found almost invaluable to those who deal with the diagnosis of fractures and injuries by means of the X-ray. The author has made a careful study of the variations noted in the hand and foot, and it is intended to be a practical as well as a scientific discussion of the subject.

It is illustrated by many photographs of the bones as well as X-ray pictures of the hand and foot, demonstrating the variations that may be found by the skiagrapher.

It is a type of book that the American surgical world would be pleased to see more of, being a monograph upon a special subject, and it is a credit both to the author and the publisher.

THE OPERATIONS OF SURGERY. By W. H. A. Jacobson, M. Ch., Oxon., F. R. C. S., Consulting Surgeon Guy's Hospital, and R. P. Rowlands, M. S., London, F. R. C. S., Assistant Surgeon and Surgeon to the Orthopedic Department, Guy's Hospital; joint teacher of Surgery in the Medical School.

In two volumes. Fifth edition. Philadelphia: P. Blakiston's Son & Co. 1908.

The friends of the last edition of this work, published six years ago, will readily recognize the present one, as there is a marked similarity in the mechanical work and the style.

The present edition is in two octavo volumes, shows an increase of 560 pages over the last, and the addition of several new and more modern illustrations.

A change is noted in the person of the joint author: Mr. F. J. Steward being supplanted by Mr. Rowlands.

The authors state that this is a work intended especially for the use of those recently appointed on a hospital staff and for those preparing for the higher examinations. The text is written in essay style, and more space is given to the discussion of indications and contraindications for, and complications and dangers of, the various operative procedures, than to the details of the operations themselves. In addition, many case records are cited and considerable attention is given to the opinions of representative men of former years, as regards surgical treatment of various conditions, showing the changes in and development of the beliefs and practices of the profession up to the present time.

Representative surgeons, of former and present times, are quoted frequently throughout the work, and the author has been kind enough to give the reference to the original paper in almost every instance.

The various operations and surgical conditions are handled from a strictly regional standpoint, that is, the various amputations, ligations, resections, etc., peculiar to a region, are described under the surgery of that region — not as a whole. When referring to the text, this is of advantage to the reader from the standpoint of surgical and regional anatomy, but is the cause of some repetition on the part of the author.

The first volume includes the operations on the upper extremity, operations on the head and neck, and operations on the thorax.

In the second volume, the author first discusses ligation of the various vessels, and then goes on to the consideration of the various types of hernia.

Considerable discussion is given in regard to the time for operation in appendicitis, both views being taken up in turn.

As regards general peritonitis, the authors are not dogmatic in their conclusions, recommending, however, drainage (rubber tube) and, in what they term "septic cases," favor irrigation.

Surgery of the kidney and ureter is handled at some length — particular attention being given to diagnosis in kidney conditions.

A chapter on gynecological operations is included in this volume.

It would seem to us that the book is one of value to the general practitioner and to the young man entering his hospital work, as it is written in conservative style and discusses at some length the various sides of the problems that may arise.

The chief fault we find in the work is that the author has made up the present edition by simply adding on to the preceding ones. The result of this procedure is that the volumes are somewhat bulky for the purpose for which they were written, and the reader is obliged to sort out the information he desires from a considerable amount of ancient history.

As a whole, the work makes rather interesting reading, and the references to the teachings of prominent surgeons of the past twenty-five years will be of use in giving the reader a review of the development of modern surgery.

The volumes are indexed both as to subjects and to authorities quoted.

The mechanical work leaves a great deal to be desired. The illustrations are, for the most part, old style woodcuts, showing, in some cases, gentlemen, wearing coat and cuffs, doing amputations, etc.

The type is, in part, rather small for comfortable reading.

A MANUAL OF ORTHOPEDIC SURGERY. By Augustus Thorndyke, M. D.

Dr. Thorndyke has prepared a manual which is concise, clearly written, and presents as many of the important details as can be brought together in a book of this size. In attempting a new classification, he has made a bold stroke that will certainly add to the clearness of the picture for the beginner and the general practitioner. Part II. is particularly instructive, and at the same time so simple that any one can grasp the principles involved, and apply the same with some degree of intelligence. The chapter on plaster, and other appliances, is also good, giving the author's experience and a comparison of the methods of other men in such a way as to leave a choice open to the student, of two or three well-recognized and thoroughly tried modes of treatment.

The book as a book, is a credit to the author and publishers; compact, fully illustrated and handsomely bound. WILLIAM R. CUBBINS.

BOOKS RECEIVED.

COMPEND OF SURGERY. By Orville Horwitz, B. S., M. D. Sixth edition. Philadelphia: P. Blakiston's Son & Co. 1907. Price, $1.00.

MODERN OTOLOGY. The principles and Practice of Modern Otology. By John F. Barnhill, M. D. and Ernest De W. Wales, M. D. Philadelphia and London: W. B. Saunders Company, 1907. Cloth, $5.50, net; Half Morocco, $7.00, net.

DISEASES OF THE NOSE AND THROAT. 4th Edition. By D. Braden Kyle, M. D. Philadelphia and London: W. B. Saunders Company, 1907. Cloth, $4.00, net; Half Morocco, $5.50, net.

ATLAS AND TEXT BOOK OF HUMAN ANATOMY. Volume III. By Prof. J. Sobotta, Wurzburg. Edited by J. Playfair McMurrich, M. D. Toronto. Philadelphia and London: W.B. Saunders Company, 1907. Cloth, $6.00, net; Half Morocco, $7.50, net.

REFERENCE HANDBOOK OF OBSTETRIC NURSING. By W. Reynolds Wilson, M. D. Philadelphia and London: W. B. Saunders Company, 1907, Flexible leather, $1.25, net.

DISEASES OF CHILDREN FOR NURSES. By Robert S. McCombs, M. D. Philadelphia and London: W. B. Saunders Company, 1907. Cloth, $2.00, net.

THE PRACTICAL MEDICINE SERIES. Volume x. Nervous and Mental Diseases. Edited by Hugh T. Patrick, M.D. and Charles L. Mix, M.D. Series 1907. Chicago: The Year Book Publishers.

MATERNITY. By Henry D. Fry, M. D., Sc. D., Washington, D. C. New York and Washington: The Neal Publishing Company. Price, $1.50.

ABDOMINAL HERNIA. Its Diagnosis and Treat. ment. By W. B. De Garmo, M. D., New York-Philadelphia and London: J. P. Lippincott Company. 1907.

THE SEXUAL INSTINCT. Its Dangers as Affecting Heredity and Morals. By James Foster Scott, M. D. Second edition. New York: E. B. Treat & Co. 1908. Price, $2.00.

HOSPITAL TRAINING SCHOOL METHODS AND THE HEAD NURSE. By Charlotte A. Aikens. Philadelphia and London: W. B. Saunders Company, 1907. Cloth, $1.50, net.

MORTMAIN. By Arthur Train. Fiction. D. Appleton & Company, New York, 1907. Illustrated, cloth, $1.50.

A VERY YOUNG OVUM IN SITU. By Prof. G. Leopold, Dresden. Authorized English Translation by W. H. Vogt, M.D., St. Louis, Mo. C. V. Mosby Company, St. Louis, 1907. Price $3.50.

A TEXT-BOOK OF MINOR SURGERY. By Edward Milton Foote, A.M., M.D. D. Appleton & Company, New York and London, 1908.